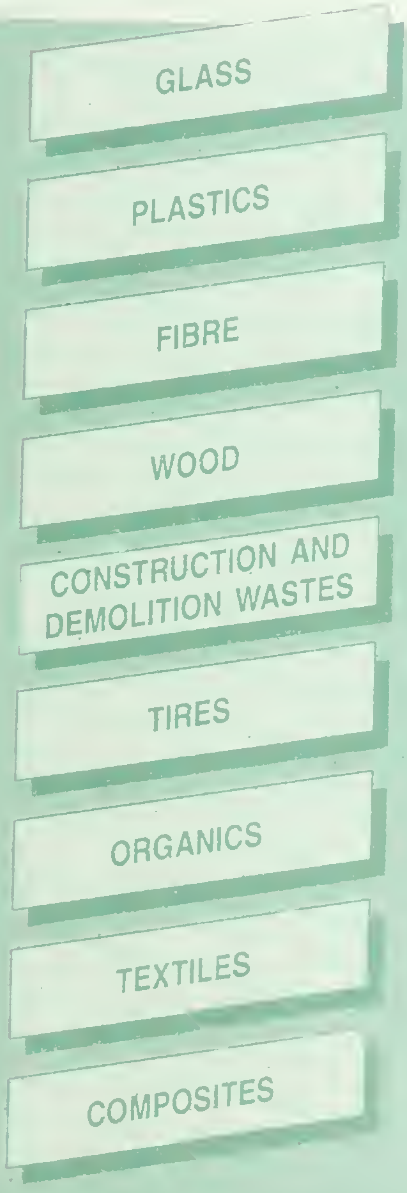
NEW Business Opportunities for Recyclable Materials

A Workshop Guide



Ontario

Ministry of Environment
and [illegible]

Preface

This guide was developed by the Ministry of Environment and Energy to assist economic development groups in planning and delivering a workshop on new business opportunities from recycled materials. It was designed to help stimulate private sector interest in developing local businesses based on material reuse and recycling.

The guide contains a 100-page handbook which details the potential markets for recyclable materials, samples of successful recycling businesses and key factors for success.

The guide also contains an overview of the workshop concept, a detailed list of organizational tasks for successfully delivering the workshop, a sample agenda and brochure, and several sample formats for gathering local information. Also included is a workshop evaluation form and a post workshop survey. These materials are contained in the enclosed Wordperfect 5.1 disk for your convenience.

For more information on new business opportunities for recyclable materials, or additional copies of this workshop kit or the handbook, call or write:

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Printed on recycled paper

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Handbook

Workshop Overview

Purpose

- To stimulate the establishment of local enterprises that use locally generated secondary materials available from recycling operations or directly from commercial/industrial sources. The establishment of local enterprises strengthens the economics of recycling, creates local jobs and contributes to local economic development and diversification.

Expectations

- The workshop will be an opportunity for participants to exchange ideas, form networks, make contacts, and gather essential information that will lead to new businesses which will, in turn, create local jobs and help sustain recycling.

Target Audience

- Local business community, existing and potential entrepreneurs, waste generators, users and generators of recyclable materials, and existing recycling businesses.

- Minimum 20 to 30 participants.

Workshop Design

- Half-day workshop that looks at:
    - business opportunities and examples of existing businesses using secondary materials
    - recyclable materials available locally and in the province
    - testimonials from local enterprises that use secondary materials
    - business planning for businesses using recyclable materials
    - financing options and government support programs for new businesses (venture capital, partnerships, federal and provincial programs)
    - follow-up and networking with participants following half-day workshop

Project Coordination

- Local **economic development personnel** are responsible for overall coordination including:
    - final workshop format and agenda
    - local resource personnel
    - facilities
    - publicity
    - invitations and registration
    - workshop moderator
    - speakers and exhibitors
    - local resource materials
    - reporting on results

- Ministry of Environment and Energy's **Waste Reduction Branch** will provide:
    - workshop guide(s)
    - handbook on business opportunities for recyclable materials
    - display materials (e.g. product examples)
    - guidance on workshop logistics
    - a speaker on business opportunities for recyclable materials

Workshop Costs

- While costs can be minimal, organizers may want to charge a fee for attendance, and seek one or more co-sponsors to help offset expenses. In addition, the ministry will consider a proposal to help offset workshop costs, budget permitting.

Detailed Workshop Agenda

8:15 a.m. - 8:45 a.m.: Registration

Attendees sign in, receive workshop kit and name tag and are invited to have coffee and muffins (in the area of the exhibits), and network with others on possible business ideas.

Exhibitors set up displays. Attendees view the Waste Reduction Branch exhibit of products made from recyclable materials and visit other exhibitors (e.g. local businesses which reuse or produce products from recyclable materials, support agencies, recycling industries, interested others).

Attendees are invited to list on a flipchart wastes that may be available or wanted.

8:45 a.m. - 9:00 a.m.: Introduction

Attendees are welcomed to the workshop and the sponsors are identified. The workshop objectives and agenda are presented.

9:00 a.m. - 9:30 a.m.: An Overview of Business Opportunities for Recycled Materials

Attendees receive a comprehensive overview of the types of recyclable materials and the businesses that are possible.

General information will be provided about the growing environmental industry, availability of recyclables provincially and the range of businesses for recycled products.

Examples of products/operating businesses (locally and outside the area) using recycled materials will be highlighted.

9:30 a.m. - 9:50 a.m.: Recyclables Available Locally

Attendees learn about local waste generation and sources and quantities of available recyclables as well as information on current markets and prices for recyclables.

9:50 a.m. - 10:10 a.m.: Break

Attendees are invited to have coffee and view the displays. The break provides an opportunity for attendees to network.

10:10 a.m. - 11:10 a.m.: Business Panel

Attendees are given business profiles of successful examples of reuse/recycling based ventures.

Three to four guest speakers (preferably existing or potential reuse/recycling entrepreneurs from the local area) provide an overview of their businesses and products. Speakers are also asked to provide tips on seeking financing, estimating market potential, developing a winning business plan and finding a location for a business.

11:10 a.m. - 11:30 a.m.: Business Planning for Recycling/Reuse Businesses

Attendees learn about the key steps for successfully launching and operating a recycling/reuse business.

An overview will be provided on business planning for recycling/reuse businesses. The following key steps will be presented: defining and confirming the market, partners one may need, return on investment and expected risks, developing a business plan, securing financing and implementing the plan.

11:30 a.m. - 12:00 noon: Financing Options & Government Support Programs

Attendees receive an overview of financing options and governmental loans and grant programs appropriate to recycling/reuse businesses.

The suitability of different financing options is covered (e.g. venture capital, bank financing) as well as federal and provincial grant and loan programs (e.g. Innovation Ontario, Business Improvement Loans [ISTC] appropriate to recycling and reuse businesses).

12:00 noon - 1:00 p.m.: Light Lunch

Lunch is served, providing another opportunity for networking. Completed evaluation forms will be collected after lunch.

1:00 p.m. - 3:00 p.m.: Networking of Organizers and Attendees

Attendees and organizers have an opportunity to pursue business ideas with speakers, exhibitors and other attendees and plan the next steps. Host and organizers assist in facilitating networking, note potential business ideas, provide guidance on next steps and follow-up with attendees and others to move ideas ahead.

Phase 1: Workshop Design

Step 1: Planning

Twelve weeks prior to delivery:

☐ **Review needs and set objectives**

- — Review workshop overview, roles and responsibilities, and available support. Revise as appropriate to meet local circumstances.

☐ **Set the agenda**

- — Appoint chairperson and designate speakers (refer to the detailed agenda for help in identifying suitable speakers).

☐ **Establish team and assign tasks**

- — Enlist involvement of resource personnel to assist in organizing and delivering the workshop (e.g. economic, recycling, other personnel). Assign specific tasks.

☐ **Set workshop date and location**

- — Choose the date that doesn't conflict with other activities, such as a planned recycling conference. Establish a registration fee, if appropriate, to cover cost of light lunch and room rental.

Sample 1 Agenda

Phase 1: Workshop Design

Step 2: Support and Co-Sponsorship

Ten weeks prior to delivery:

☐ **Contact key agencies**

— Introduce the workshop concept to key businesses in the area and other members of the community with an interest in local economic development. Consider contacting the Chamber of Commerce, local service organizations, and businesses using recyclable materials.

— Approach other appropriate community groups to get advice and support. Consider environmental groups, waste and recycling associations, and municipal waste management personnel.

☐ **Confirm co-sponsors**

— Get a commitment from above groups/organizations to promote and/or co-sponsor the workshop, either by telephone or letter.

Sample 2 *Letter requesting support*

Phase 2: Research and Promotion

Step 3: Speakers and Exhibitors

Eight weeks prior to delivery:

☐ **Gather local information**

- — Compile information on economic development and business support resources in the community.
- — Compile information on local businesses using recycled materials in products (cottage, small, medium, large).

☐ **Confirm speakers and exhibitors**

- — Choose suitable speakers and exhibitors from the listings and confirm availability to speak and exhibit at the workshop. Offer them recognition and free admission. Provide them with an outline for their presentation.

Samples	*3*	*Format for listing information on local resources*
	4	*Format for listing information on local reuse/recycling businesses*
	5	*Guideline for speakers' presentations.*

Phase 2: Research and Promotion

Step 4: Promoting the Workshop

Eight weeks prior to delivery:

☐ **Prepare workshop brochure**

- — Prepare an invitation to suit local circumstances. You may want to consider a brochure like the sample enclosed.

☐ **Prepare list of attendees**

- — Develop a list of potential attendees, including the media. (See *Contacting Media* over.) Consider calling businesses to determine appropriate person to invite. (Refer to *Workshop Overview* for suggestions.)
- — Mail invitations, hand them out at relevant meetings or have your co-sponsors distribute the to their key audiences/members.

Two weeks prior to delivery:

- — Follow-up with key participants, including the media, to encourage attendance and to compile list of registrants.

Sample 6 *Brochure invitation*

CONTACTING MEDIA

- Prepare a list of all local and area business editors/reporters at daily and weekly newspapers, business and trade publications, and radio and television stations.

- Call to outline your workshop plans and get their support. Encourage them to publicize your event, and invite them to attend. They may choose to interview you or a key organizing committee member so be prepared or have someone in mind.

- Contact business magazines 60 days or more in advance of your event to determine if there are relevant up-coming business event listings that would be suitable.

- Follow-up by telephone just prior to the event to remind reporters, and immediately following the event, to offer your assistance in providing story ideas or to gather additional information for them.

Phase 2: Research and Promotion

Step 5: Local Information on Recycling & Disposal

Six weeks prior to delivery:

☐ **Gather local information on availability of recyclables**

— List material types, quantities, end markets and prices, and sources of recycled materials currently collected through municipal and IC&I programs. Local municipal recycling staff or waste/recycling contractors will be able to supply this information.

— List types and quantities of wastes generated and recycled in the local area. Data from local waste composition studies can be used to supply this information.

Samples 7 *Form for listing information on local availability of recyclable materials (specify if data is for municipal or industrial, commercial and institutional [IC&I] recycling programs or both)*

8 *Format for listing information on waste generation and recycling.*

Phase 3: Delivery

Step 6: Workshop Logistics

One to two weeks prior to delivery:

☐ **Audio visual needs**

- — Arrange for audio visual equipment for speakers.
- — Arrange for set-up equipment (tables, electrical outlets) for exhibitors.
- — Finalize numbers, refreshments and lunch.

☐ **Registration**

- — Identify needs for registration (sign-in table, name tags, signage).
- — Organize staff to assist with registrations.
- — Compile list of registrants.

Phase 3: Delivery

Step 7: Participant's Kit

Two weeks prior to delivery:

☐ **Printing**

- Arrange printing of participant's kit, name tags and a folder to hold workshop materials (select printing paper preferably made in area from recycled materials).

☐ **Contents**

- Include participants handbook, *New Business Opportunities for Recyclable Materials.*
- Include evaluation form (see Step 8).
- Include workshop agenda (see Sample 1), and a list of participants (names, titles, businesses, telephone numbers and addresses).
- Include local information on resources and reuse/recycling businesses in the local community, recycling and waste generation information.
- Include other support materials (e.g. Ontario Waste Exchange brochure, 3Rs regulations, and other appropriate materials).

Enclosure:

- *Handbook (not included on disk). Ministry will provide sufficient quantities for the workshop.*

Phase 3: Delivery

Step 8: The Event

Day of event:

☐ **Setting up**

- — Post signs, set up registration table, assist exhibitors in setting up displays, set up audio visual equipment, arrange seating and refreshments, register attendees and hand out kits.

☐ **Delivery**

- — Review objectives and agenda for the workshop.
- — Conduct the workshop.
- — Identify next steps.

☐ **Follow up**

- — Collect evaluation forms.
- — Speakers and presenters should be available following the workshop to follow up with participants.
- — Hold de-briefing, review evaluation forms, identify lessons learned, and arrange follow up tasks.

Sample 9 *Workshop evaluation form*

Phase 4: Feedback

Step 9: Reporting on event

Day of workshop:

— Prepare a news release on meeting results for distribution to the media immediately following event. See *Tips on Writing a News Release* (over). Alternatively, you may want to make personal calls to the media contacts you established earlier. Describe what happened at the workshop, especially any new business ideas, and offer names of workshop participants that can provide additional details.

Sample 10 News clipping from Kingston workshop

TIPS ON WRITING A NEWS RELEASE

- The lead paragraph should include the major piece of news you're attempting to communicate. For example, the potential new business(es) that may result because of the workshop.
- The lead paragraph should incorporate, if possible, "who, what, where, when, why and how".
- Attribute any announcements in the lead paragraph to a person or organization.
- Back up the lead with facts or supporting statements.
- Use quotes liberally, but for clarity, use no more than two or three people.
- Avoid jargon.
- Use an active, not passive, voice.
- Use the past tense.
- Try to keep the release short - no more than two pages, if possible.

FORMATTING A RELEASE

- Put "For Immediate Release" at the top right corner of the page, and the date underneath it.
- Use 1.5 spaces between lines.
- Write a brief, descriptive headline.
- Indicate that the release continues on another page with the word "more". Use "-30-" at the end of the release.
- Following the "-30-", write "For further information contact:" and list the name, organization and telephone number of one or more people the media can call.

Phase 4: Feedback

Step 10: Post Workshop Reporting

Four to six months after:

- Survey attendees on any business initiatives resulting from workshop by letter or phone.
- Promote ongoing initiatives through news releases or direct media contact.
- Advise the ministry's Waste Reduction Branch of success stories for possible province wide promotion.

Samples 11 Post workshop survey

12 Format for reporting workshop results to ministry

Sample 1

Agenda

New Business Opportunities for Recyclable Materials

8:15 - 8:45 a.m.	Registration	Pick up kits, coffee, view exhibits
8:45 - 9:00 a.m.	Introductory remarks	Economic Development Officer
9:00 - 9:30 a.m.	An Overview of Business Opportunities for Recyclable Materials	Cathy Cirko, Ministry of Environment and Energy
9:30 - 9:50 a.m.	Recyclable Materials Available Locally	Local Recycling Staff
9:50 - 10:10 a.m.	Network Break	Coffee, view exhibits
10:10 - 11:10 a.m.	Business panel (testimonials from existing/potential entrepreneurs)	Guest speakers
11:10 - 11:30 a.m.	Business Planning for Recycling Businesses	Business Start-Up Service Official
11:30 - 12 noon	Financing Options and Government Support Programs	Provincial Economic Development Official
12 noon	End of formal session/light lunch	
1:00 - 3 p.m.	Networking of organizers and attendees	

Sample 2

Dear

The (name of organizing group) is planning a unique workshop on new business opportunities for recyclable materials in (month).

As you may be aware, opportunities exist in the recycling industry to expand markets, create new ones and, in the process, generate thousands of new jobs. In fact, conservative estimates suggest that recycling has the potential to generate thousands of new jobs in Ontario by the year 2000.

We hope to capitalize on these opportunities by bringing together existing environmental businesses, waste stream generators and entrepreneurs in a half-day event to hear about the many opportunities, share ideas, form networks, make contacts, and explore partnerships and new business ideas.

We will be seeking speakers to discuss a variety of topics including examples of existing businesses using secondary materials, recyclable materials available locally and provincially, business planning, financing options and government support programs.

To ensure the workshop's success, we need your help.

We would greatly appreciate any advice you can offer to identify attendees/speakers or local businesses using recyclable materials, or any thoughts you may have on the concept.

Your financial/promotional support would be greatly appreciated, too. In return, your name will be included in workshop materials, and on invitations and signage.

I look forward to discussing this with you at your convenience.

Sincerely,

Sample 3

Information on Local Resources

The following is a list of organizations, government agencies, and industry associations that can help reuse/recycling businesses in (name of city/area).

Name:
Address:
Tel. #:
Contact Person:

Services provided:

Name:
Address:
Tel. #:
Contact Person:

Services provided:

Name:
Address:
Tel. #:
Contact Person:

Services provided:

Name:
Address:
Tel. #:
Contact Person:

Services provided:

Name:
Address:
Tel. #:
Contact Person:

Services provided:

Name:
Address:
Tel. #:
Contact Person:

Services provided:

Name:
Address:
Tel. #:
Contact Person:

Services provided:

Name:
Address:
Tel. #:
Contact Person:

Services provided:

Examples of Local

Reuse/Recycling Businesses

The following is a list of reuse/recycling businesses in (city/area) that reuse or make products from recyclable materials (as much information as possible has been listed).

Company Name
Address:
Tel. #:
Contact Person:

Business Overview:

Product/market:
Type and quantity of recycled materials used in the product:
Specifications and purchase price for recycled materials:
Process description:
Number Employed:

Company Name
Address:
Tel. #:
Contact Person:

Business Overview:

Product/market:
Type and quantity of recycled materials used in the product:
Specifications and purchase price for recycled materials:
Process description:
Number Employed:

Sample 5

Guidelines for Speakers' Presentations

- Overview
    - Products/markets
    - Type and quantity of recyclable materials used in production
    - Recyclable material specifications and purchase price
    - Processing description
    - Number of employees
    - Capital costs and operating capacity
- Tips on successfully launching a business
    - Seeking financing
    - Estimating market potential
    - Developing a winning business plan
    - Finding a location for the business
    - Evaluating business successes
- Do's and don'ts

Sample 7

Information on Local Availability of Recyclable Materials

Material Type	Quantities Currently Collected (tonnes/yr)	Current End Market (name and location)	Material Revenue ($/tonne after freight costs)	Local Sources of Recyclables Collected (name and location)

Sample 8

Information on Local Waste Generation, Reuse, Recycling and Disposal

Residential Waste

Material Type	% of Waste	Tonnes Generated	Tonnes Reused	Tonnes Recycled	Tonnes Disposed

Information on Local Waste Generation, Reuse, Recycling and Disposal

IC&I Waste

Material Type	% of Waste	Tonnes Generated	Tonnes Reused	Tonnes Recycled	Tonnes Disposed

Sample 9

Workshop Evaluation Form

New Business Opportunities for Recyclable Materials

1. Please rate the usefulness of the workshop on a scale of 1-7 (7 is high)

1 2 3 4 5 6 7

What aspects did you find useful? ______________________________

What aspects did you not find useful?______________________________

____

2. What did you like the best/least about the workshop?

BEST:______________________________

____

LEAST:______________________________

____

3. Please rate the following sessions:

a) Guest speakers 1 2 3 4 5 6 7

What information did you find useful?

What was not useful?

b) Examining Opportunities 1 2 3 4 5 6 7

What information did you find useful?

What was not useful?

c) Local Availability of recyclable Materials 1 2 3 4 5 6 7

What information did you find useful?

What was not useful?

d) Business Planning for Recycling Business 1 2 3 4 5 6 7

What information did you find useful?

What was not useful?

e) Financing Options + Government Support Programs 1 2 3 4 5 6 7

What information did you find useful? ____________________

____

What was not useful? ____________________

____

5. Please rate the following on a scale from 1-7 (7 is high)

- the organization of the workshop 1 2 3 4 5 6 7

Comments: ____________________

____

- the speakers/facilitators 1 2 3 4 5 6 7

Comments: ____________________

____

- the materials/kit provided 1 2 3 4 5 6 7

Comments: ____________________

____

6. Do you have any suggested changes or modifications for future deliveries of the workshop?

____

____

7. Contacts

a) How many contacts/ideas have you made that are related to a possible business opportunity?

b) What are they?

____

____

____

____

8. Resources

a) Which resources provided do you think will be (or have already been) particularly useful?

____

____

____

____

____

9. Next steps

a) What are your next steps coming out of this workshop?

____

____

____

____

____

Sample 10

mediascan
Canada's national news monitoring network
Le réseau national d'extraits de presse du Canada

WHIG-STANDARD
114
MAY 4, 1994
Kingston

From used asphalt to crushed toilets, 'green' companies talk shop

THE KINGSTON BUSINESS COMMUNITY received an offer last week that will be difficult to refuse. It came from Denis Richards, the owner of Enviroblock Surfacing Canada Inc., a Mississauga company that builds "virtually indestructible" roads, driveways, parking lots, sidewalks, pathways, school yards — you name it — from used asphalt pavement, scrap rubber tires and plastics.

Richards told a conference on Business Opportunities for Recyclable Materials that he s seriously looking at the Kingston area as the site for a second Enviroblock factory (which he would license). The company built a major oadway out of Enviroblocks in Mississauga last year. According to Richards, it didn't move "an eighth of an inch" despite the harsh winter conditions.

"The MOT (Ministry of Transportation) can't put a life on this product," says Richards. In fact, he boasted, the black interwoven paving blocks (they are colored with discarded toner from Xerox copying machines) are so strong they "confused" the machines that were used to test them against traditional asphalt. The Enviroblock technology is patented in 40 ountries.

The Belleville-to-Brockville corridor is "a able area with sufficient feedstock [raw aterials]," said Richards. "I think it would be ractical to have a new plant right here in ngston." He was too polite to mention that we ve enough rotten roads and potholes to keep n Enviroblock factory chugging away for at ast several decades.

THE ENVIROBLOCK APPEAL WAS THE MOST tangible business opportunity to emerge om the one-day conference, which drew 52 ople from the public and private sectors. The ent, which was chiefly an opportunity for presentatives from the environmental dustry to talk shop, was a first for the Kingston ea.

The Enviroblock opportunity alone would enough to declare the conference a success rth repeating. But Angus Ross, a professor of vironmental engineering technology at St. wrence College who organized the nference, said there were three or four other usiness connections" made during the day at also look promising.

At least one of those connections may nerate employment for about 25 men and women from the Kingston and District Association for Community Living who are currently employed in the association's sheltered workshop on Railway Street. The conference was organized, in part, to explore new job opportunities for this group, many of whom are tired of the workshop and yearn for change.

The association, which is also under pressure from the province to reform the workshop, has been seeking new work challenges for the developmentally disabled workers that would pay the legal wage and offer the same long-term security as the workshop.

What attracted the association to environmental industries was the low-skill labor requirements of many such companies. What attracted many entrepreneurs to the conference was the fact that environmental industries are growing at the rate of seven per cent a year — and they want a piece of the action.

Cathy Cirko of the Ontario Ministry of Environment and Energy told delegates there are about 3,500 environmental companies across Canada. Together they employ 150,000 workers. "The area of environmentally preferred products is taking off," she said.

The conference also heard from Brent Bolger of Kub Coatings on Terry Fox Drive, which manufactures new paint from old paint. Bolger talked about the difficulties of starting a business before government specifications had been developed for it. Among the many challenges, Bolger said, was defending his product to skeptical colleagues in the paint industry.

Architect Vince Catelli, a "keen supporter" of the non-profit Ottawa Restore, which recycles construction and demolition materials, urged delegates to be practical but innovative. Restore, for example, encourages the use of low-flow toilets that use less water. Old ceramic toilets are then crushed and used in decorative landscaping.

Examples of broken-up toilets and other "green products," such as T-shirts made from pop bottles, were on display. Catelli also told of selling an old door for $7 to someone who turned it into a beautiful table that sold for $800.

In addition to hearing from businesses that use recycled materials, the conference provided an overview of the surprising amount of recycling activities in the province and the various government programs available to help companies turn "green."

Joe Davis, general manager of the Kingston Area Recycling Corporation, summed up the theme of the day very nicely when he noted that "One man's trash is another man's treasure."

BUT THE CONFERENCE ALSO SHOWED THAT there are no easy routes to economic development. As Angus Ross said later: "All you can do is get all the pieces on the table and hope somebody makes a cake out it."

Like Enviroblock. All it needs now is a good cook.

By ANN LUKITS

Sample 11

Post Workshop Survey

Name of Workshop Attendee:

Date:

1. How many contacts that you made at the New Business Opportunities for Recyclable Materials Workshop did you follow up on? What was the result?

2. How many contacts are you still planning on contacting? For what purpose?

3. How many new business ideas/concepts that you obtained from the workshop are you pursuing/implementing (fill in as much information as possible).

   Business Idea No.1
   End Product:
   Feedstock:
   Process/Equipment:
   Potential Revenue:
   Minimum Capital Requirements:
   Employment Potential:
   Factors for Success:
   Possible Location:

   Business Idea No.2
   End Product:
   Feedstock:
   Process/Equipment:
   Potential Revenue:
   Minimum Capital Requirements:
   Employment Potential:
   Factors for Success:
   Possible Location:

4. What is the status of the potential business idea and your next steps?

   Business Idea No.1:
   Business Idea No.2

Report on Workshop Results

1. How many contacts made at the New Business Opportunities for Recyclable Materials Workshop were followed-up? What was the result?

2. How many contacts are workshop attendees still planning on pursuing? For what purpose?

3. How many new business ideas/concepts obtained from the workshop were pursued (fill in as much information as possible).

Business Idea No.1
End Product:
Feedstock:
Process/Equipment:
Potential Revenue:
Minimum Capital Requirements:
Employment Potential:
Factors for Success:
Possible Location:

Business Idea No.2
End Product:
Feedstock:
Process/Equipment:
Potential Revenue:
Minimum Capital Requirements:
Employment Potential:
Factors for Success:
Possible Location:

4. What is the status of the business ideas and the next steps?

Business Idea No.1:
Business Idea No.2:

NEW Business Opportunities for Recyclable Materials

- GLASS
- PLASTICS
- FIBRE
- WOOD
- CONSTRUCTION AND DEMOLITION WASTES
- TIRES
- ORGANICS
- TEXTILES
- COMPOSITES

Ontario

Ministry of Environment
and Energy

For more information on new business opportunities for recyclable materials, or additional copies of this handbook, call or write:

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PREFACE

This handbook *'New Business Opportunities for Recyclable Materials'* was prepared by RIS Ltd. for the Ontario Ministry of Environment and Energy as part of a ministry-funded project. The views and ideas expressed in this report are those of the author and do not necessarily reflect the views and policies of the ministry nor does mention of trade names or commercial products constitute endorsement or recommendation for use.

The handbook was developed to help stimulate the establishment of local enterprises that use locally generated secondary materials. Establishing these types of local enterprises not only strengthens the economics for recycling, but also contribute to local economic development and diversification.

The handbook contains background information on the kinds of opportunities and enterprises that could be established using reusable and recyclable materials. Sufficient information has been provided to allow one to get started with the in-depth research that would be required, for the preparation of a business plan, for example.

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Introduction 2
Background information on the waste management and recycling situation in Ontario

Material Overview
Various reuse and recycling processes and end products for nine different recyclable materials, along with brief examples of existing programs.

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ARKET DEVELOPMENT GOALS
DED BY PUBLIC/PRIVATE
TIATIVES

ECONOMIC DEVELOPMENT
TAKES A RECYCLED STEP

local markets and economic
development

Build Green

Creating jobs from recycling

Industry and
Government
Build World's
First Green
Dream Home

DS FOR THE GREENEST
AND THE GREATEST

Introduction

NEW FIRMS
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Solid Waste - An Opportunity
for the Innovative Entrepreneur

The ever-increasing quantities of collected materials require more creative approaches to strengthen market conditions for recyclables.

Recycling Entrepreneurship:
Creating Local Markets for Recycled Materials

Creating an
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Introduction

Reuse and recycling industries convert materials from solid waste into marketable materials and products. In some cases, the waste materials are reused (cleaned and reconditioned for use in their original form) or in others they are recycled (remanufactured into a new product or material). A range of materials is processed by reuse/recycling industries — including paper, plastic, metals, tires, wood, textiles, construction and demolition waste, and organic yard and food waste. The sources of these materials are post-industrial (process scrap, off-cuts, off-spec materials, etc.) and post-consumer (used products and packages, etc.)

In any community there are major opportunties for the growth and development of reuse and recycling industries. This is particularly true if a large infrastructure for the collection of secondary materials already exists (e.g. a blue box system, and recycling programs in businesses and institutions).

Many reuse and recycling industries are well-established. Traditionally, these industries developed in response to economic opportunities — when the recovery of secondary materials was cheaper than the extraction of primary materials. Since the mid-1980s, however, recycling has evolved into an integral part of waste management, in an effort to reduce the flow of solid waste to landfill. With the help of public investments, recycling systems — focussed mainly on collection — have been built throughout North America. Ontario's blue box system is the largest of its kind anywhere in the world.

The growth of reuse and recycling industries — the companies that use these materials — has not kept pace with this rapidly expanding infrastructure. As a result, there is an unprecedented need, and opportunity, for this form of industrial development.

Reuse/Recycling Industries and the Environment

Reuse and recycling industries are part of the fast-growing environmental industries sector. They offer several environmental benefits, including:

- diversion of solid waste from landfill: a small number of communities in Ontario have already achieved diversion rates of up to 40-50%, using aggressive recycling and composting programs. Ontario has achieved a 25% diversion rate and the goal for the year 2000 is to have the entire province diverting waste at a rate of 50% or more.
- closing the "loop": the job of reuse and recycling industries is to close the loop — to put secondary products and materials back into productive use. Reuse and recycling happens only when this job is done.
- energy conservation: industrial production using primary materials almost always consumes far more energy than an appropriate reuse or recycling alternative.
- reduced transportation: the long distance movement of goods and materials in our economy exacts a high environmental cost in terms of energy consumption, air pollution and global warming. This is reduced whenever reuse and recycling industries allow materials to be remanufactured and redistributed locally.

Reuse/Recycling Industries and Economic Development

Relatively few studies have attempted to quantify or project the economic impact of reuse and recycling industries. Those that have been done have provided the following insights:

- job creation: recycling creates an average of 2.25 jobs in collection and processing for each 1,000 tons of material, based on available data from Canada and the U.S. There is a potential for another 4.65 jobs in manufacturing for each 1,000 tons, according to the Institute for Local Self Reliance in the U.S.
- economic growth: environmental protection and pollution control industries — including reuse and recycling — represent one of the fastest growing sectors of our economy.
- keeping materials in the local economy: value is added and jobs are created whenever materials are used and reused locally, rather than simply used once and disposed of or exported.
- reduced disposal costs: waste disposal is quickly becoming a major economic concern for both private and public sector waste generators. Reuse and recycling keeps the costs of disposal down.

Trends: Consumer and Business

Several key market trends are creating conditions that support the creation and growth of reuse and recycling industries:

- **Consumer demand for "environmentally-preferred" products continues to grow.** Consumers are becoming increasingly well-informed about the environment, and familiar with the issues and the terminology. Most are concerned about any product or service that may negatively affect personal health. Canadians expect competitive prices and environmental performance. According to Marjorie MacPherson of Decima Research, a major Canadian polling company, "Not only has Canadians' commitment to the environment remained intact, but there is evidence that their understanding of environmental issues is growing. One example of this heightened understanding is in the area of solid waste management." Many Canadians are sceptical of companies making unsubstantiated environmental claims, and wary of "greenwashing".

- **"The environment" is moving from a "hot issue" to a mainstream consideration in business and personal decision making.** Although polls indicate that unemployment and the economy have surpassed the environment as "the most important problem" for Canadians (2% see the environment as the top problem while 39% view unemployment as their first priority), this does not mean that the environment has disappeared as a concern. For example, Statistics Canada reports that 95% of Canadians with access to recycling service choose to recycle at least paper, and 45% of all Canadians buy recycled content paper. Canadians want jobs **and** a protected environment. There are opportunities for those who can deliver both.

- **NIMBY — Not In My Back Yard — is a powerful force at the local level which is becoming more intense.** The politics and logistics of siting disposal facilities are becoming increasingly difficult and complex (e.g. protracted landfill controversies in the Greater Toronto Area). There is no "technical fix" — **all** disposal facilities provoke NIMBY reactions. Siting and construction costs are rising rapidly, and will continue to rise to unprecedented levels. As these costs rise, the pressure to find "3Rs" alternatives will intensify and the opportunities for 3Rs ventures will multiply.

- **There is growing public resistance to the environmental costs of primary resource extraction.** High profile resource controversies (e.g. logging controversies in Temagami, Clayoquot Sound) and man-made disasters (e.g. Exxon Valdez) are making people increasingly aware of the environmental impact of the primary resource economy. In a recent national poll by Environics Research Group Ltd., 70% of those polled felt clearcutting was too widely practiced. Timely alternatives may be found in the secondary resource economy (e.g. reuse and recycling).

- **Environmental considerations are becoming part of "the cost of doing business".** Most progressive companies now factor "environment" into at least some of their ongoing business decisions. For example, a recent business survey indicated that 924 Fortune 500 companies planned to spend US$3.6 billion on recycled-content products in 1992 — an increase of 772% over the US$470 million that these same corporations spent in 1989.

- **Public pressure is building for increased corporate responsibility and "product stewardship".** Product stewardship suggests that companies assume responsibility for environmental costs associated with their products throughout their entire life cycle, not just during production. Several corporations have already adopted elements of product stewardship. Similarly, a growing number of industry associations are beginning to move toward product stewardship (e.g. packaging stewardship proposals by the Grocery Products Manufacturers of Canada). Product stewardship implies responsibility for post-consumer products and packages, and a growing need to reuse and recycle.

- **The environmental protection industry is booming.** Total expenditures for environmental services and pollution control equipment in Ontario were already estimated at about $2.5 billion annually in 1989, the same year that the province's logging industry generated $1.3 billion. Improving the environment is one of the most dynamic and fastest growing sectors of our economy. It is also highly competitive; businesses and governments throughout North America and the world are recognizing the potential of environmental industries and in investing in their development.

Trends: Government

A number of important trends in waste management policy are also creating needs and opportunites for reuse/recycling industries:

- **The range of materials acceptable for waste disposal is becoming increasingly narrow.** Landfill disposal bans and restrictions on materials such as cardboard, drywall, tires, and construction and demolition materials are now a common policy tool for local governments.

- **Recycling and composting are becoming mainstream waste management practices, province-wide.** Ontario already has one of the most extensive curbside recycling systems in the world. More than 3 million households now have curbside blue box service. Ontario is encouraging all waste generators to contribute towards achieving the 50% diversion rate target. New regulations in Ontario make recycling and backyard composting programs mandatory in communities of more than 5,000 people. Collection and composting of leaf and yard waste are required in all communities over 50,000. In addition, many larger businesses across the province are required to complete waste audit and reduction plans, and implement recycling programs. The province is moving toward a comprehensive system of recycling and composting. Therefore, further growth in secondary materials supply is assured.

- **In many jurisdictions, the thrust of recycling policy is beginning to shift from "supply" (i.e. collection infrastructure) to "demand" (i.e. market development).** Recycling policy has traditionally been driven by waste management concerns and oriented toward expanding collection infrastructure. There is a growing recognition that growth in supply must be balanced by growth in demand, so policy-makers throughout North America and Europe are moving to find ways to stimulate market development.

- **Increasingly, reuse and recycling industries are being recognized for their potential contribution to economic development.** These industries are seen as offering a potential "win-win" situation — solving the problem of oversupply of materials and financially unsustainable recycling programs, while also creating jobs and growth in local economies. Policy-makers are struggling with the role governments might play in making this happen.

- **Procurement policies have been the most popular market development measure so far.** Public sector procurement policies that authorize "price preferences" or "set-asides" for recycled or recyclable products are now widespread. All 50 states in America now have procurement policies of some kind. Recent innovations are found in California (where any premiums paid for recycled products are paid for from the sale of recyclable waste) and Florida (where state institutions may let contracts for closed-loop "recycling ventures" that remove waste and sell it back in the form of recycled products).

- **Incentive programs designed to attract reuse and recycling industries are also becoming widespread in the United States.** One of the strongest trends in market development policy has been the introduction of incentive programs (e.g. grants, loans, tax credits) designed to attract reuse and recycling industries. The most sophisticated incentive system to date is California's Recycling Market Development Zone (RMDZ) program; municipalities apply to have areas designated as RMDZs, where businesses become eligible for a range of incentives.

- **Marketing co-operatives are designed to pool recycled materials for marketing.** A growing number of Canadian and American jurisdictions are joining marketing co-operatives in order to gain increased leverage with national and international markets. As of mid-1992, there were at least 15 co-op marketing programs, each serving a group of municipalities and, in some cases, states or provinces.

- **Recycled content legislation is becoming a regulatory tool of choice for governments seeking to ensure market development.** Mandatory recycled content legislation for newsprint in at least nine states has already stimulated major investments in de-inking mills. Recycled content requirements have been extended to include glass containers (Oregon, California), and plastic garbage bags (California). Their application to broader ranges of products is under investigation in many jurisdictions, with significant potential implications for reuse/recycling industries.

Trends: Analysis

A review of relevant market and policy trends reveals these general conclusions:

- **Reuse/recycling industries respond directly to key market and policy trends.** These industries have the potential to:
  - deliver environmentally-preferred products
  - help reduce the need to site new disposal facilities
  - support the growth of the secondary materials economy
  - respond directly to disposal bans and restrictions
  - help keep public recycling collection systems economically viable
  - lead the shift from supply to demand development in recycling
  - respond to the need for jobs and economic development
  - help public sector organizations meet procurement requirements
  - qualify for many of the incentives being introduced or contemplated
  - meet the marketing needs of market development co-operatives
  - help major industries respond to recycled content legislation

- **Reuse/recycling industries are playing a key role in the transition from "waste management" to "materials management".** Waste management is primarily an "end of pipe" function, attempting to reduce the economic and environmental costs of post-consumer and post-industrial materials. From a waste management perspective, reuse and recycling are seen as methods of diverting waste from disposal. Materials management, on the other hand, deals with the full life cycle of materials. Materials management looks at the entire flow of materials — into, throughout and out of an area — and considers how materials can be used as efficiently as possible and recirculated as often as possible for maximum economic benefit.

- **Reuse and recycling industries are well-positioned to enter a period of major growth.** In general, an extended period of market development is overdue to help close the "gap" created by accelerated supply development in recent years. Challenges include ensuring access to debt and equity financing, overcoming technical and regulatory barriers, training qualified personnel, and creating new and expanded markets for reused and recycled products.

- **Some recycling/reuse industries will focus on supplying materials and products to national and international markets, while others will focus on the local flow of materials.** The priorities for those industries serving national and international markets include developing large, consistent supplies of high-quality secondary materials, and producing products and materials for export. For those industries involved primarily at the local level, the priorities will include identifying opportunties for materials exchange, "closing loops" locally, and developing markets for materials that cannot be shipped economically over long distances. Strategies will vary depending on the markets served.

- **The role of governments — at all levels — will influence the speed, nature and location of reuse/recycling industry growth.** There is currently a critical policy gap. Governments at all levels have intervened in new and established commodity markets with no corresponding industrial strategies. The risks are that business opportunities will be lost, public sector investments in recycling will be wasted, and jobs and economic development will be lost to those jurisdictions that are better able to put effective policies in place. "Green industries" — including reuse and recycling — will be attracted to "green areas".

Glass

Developing non-traditional glass markets

REUSED BOTTLES FOUND TO BE CLEANER THAN NEW ONES

Vancouver -- Testing at Colona Wines, in British Columbia's Okanagan Valley, has concluded that cleaned recovered wine bottles contain lower levels of contaminants than factory-shipped new ones. The cleaning process uses less detergent than a household dishwasher. Contact: Allison MacNeil Colona Wines; 604/762-3332.

ass recycling
a continental first

Fibreglass, ar firm says it h mercial fibreg nnology. The e first of its ki America, separates into fibres and plastic r components can then be rec essed into a variety of products including boat hulls and car parts. The firm, which now operates a pilot recycling plant in Mississ plans to build a $3 million fa an process 160 tonne glass per month.

Hawaii Creates an Outlet for Islands' Glass at Home

to rely solely on them, Jones said. State officials this year passed leg
In the meantime Hawaii has to make a transition from using tradi
side collection program in Honolulu and on the rest of the

GLASS

WHO YA GONNA CALL? GLASSBLASTER

Waste Management of Seattle is considering calling on the GlassBlaster to reduce to sand its exhaustive amounts of smashed, mixed-colored glass waste for use in secondary markets.

asphalt hits NYC streets

G RECYCLERS SEEK ALTERNATIVES

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looking for large volumes of brown and green glass, even though the material
transfer station is aggregate fill in new transfer station construction projects.
has been de

National Plumbing Code Adds Recycled Glass to Drain Spec

EXPLORING NEW USES FOR GLASS CULLET

PENNSYLVANIA DOT TESTING GLASPHALT

The Pennsylvania Department of Transportation is testing a glass-content asphalt on Route

Recyclers Turn to New Markets for Green and Mixed Cullet

Illinois Firm Can Use Cullet in its Filter System

fractured na- in Knoxville, Tenn. Glass can also be

Glass - Overview

Definition

- The glass industry is commonly separated into three segments: container glass (i.e. bottles and jars), flat glass (e.g. window glass), and pressed or blown glass (i.e. stained glass, glassware, etc.).
- The main sources of scrap glass are post-industrial glass (i.e. from production processes), and post-consumer glass (i.e. from residences and industrial/commercial/institutional (IC&I) locations).

Current Market

- Post-consumer container glass from residences and IC&I locations is primarily used as feedstock in the manufacture of new glass containers.
- In Ontario, the primary market for colour-separated container glass is Consumers Glass, Ontario.
- Prices paid by Consumers Glass for glass cullet during 1992 averaged $43/ton for flint glass (i.e. clear glass) and $38/ton for green glass.
- Mixed glass is not accepted by Consumers.

Issues/Trends

- Consumers Glass is the sole Ontario market for recycling container glass into new glass containers.
- The price paid for flint glass has decreased from $60-$75/ton in 1990 to $43/ton in 1992.
- The market requires glass to be colour-separated for maximum usage. Recycling programs that commingle materials on recycling trucks to separate the glass later, will have some broken mixed glass that cannot be marketed.
- Contamination by ceramics has been a problem in the past. The current acceptance rate by the market is 99.3%.
- Alternative markets are currently required for mixed and contaminated glass.

Reuse/Recycling Processes

Reuse of Container Glass

- Glass is reuseable if made to strength and durability specifications.

Glass Crushing (Intermediate Processing)

- Glass can be crushed to various specifications for sale to a variety of end markets. Opportunities exist for "intermediate processors" with glass crushing capability, supplying a range of local end markets, including any of the glass recycling processes outlined on this page.

Crushing and Recycling Into New Glass Products

- Waste glass can be crushed and remelted and then either pressed or blown into new glass products such as tiles, figurines, bowls and other glassware (this discussion ***excludes*** the manufacture of container glass - see note below). Almost any scale of operation can be economically viable, given a high-value end product with a stable market niche. Reprocessing into new glass products is generally considered a form of specialty production that may be highly successful in business terms, but does not represent an outlet for very large quantities of waste glass.

Direct Application of Crushed Glass

- Glass can be crushed to a range of specifications and used as an aggregate in a variety of different applications from backfill to beach sand. This approach makes sense locally, especially if there is a lack of supply of other suitable aggregates, such as sand and gravel. In some cases glass outperforms the material it is replacing. Use as an aggregate has the potential to consume large quantities of waste glass.

Use of Waste Glass in the Production of Glass Fibre Insulation

- Glass can be used as a feedstock in the production of glass fibre insulation. Some existing manufacturers of glass fibre insulation have been successfully using container and plate cullet in their manufacturing.

Note: *Re Commercial Production of Glass Containers*

- The remanufacture of container glass is the traditional market for post-consumer glass containers. It involves the production of high volumes of a low-value product, within a very competitive and difficult business environment. Low profit margins require plants to be large (minimum 135 TPD) to be economical in container glass manufacturing. Further information on this remanufacturing approach will not be provided.

Glass - Reuse

Description

- Post-consumer glass containers (bottles) are sorted and washed in a bottlewashing plant, refilled and redistributed. Bottle-washing and refilling operations are typically most suitable on a small to medium scale where local markets can be served without incurring high shipping costs.

Feedstock

- Refillable containers must be designed to be stronger than standard "one-way" glass bottles in order to withstand repeated shipping and washing.

End Products

- any market for which glass containers are made

Examples

- **Avalon Dairy** fills 30,000 bottles per day, six days a week at its plant in Vancouver, British Columbia. Yearly production in refillables has been increasing at a rapid pace. Sales of milk in refillable bottles grew from 1% of total sales in 1989 to close to 5% in 1990. Avalon bottles milk for its own customers, and also for Dairyland, a large dairy that distributes Avalon milk to its home delivery customers. Avalon supplies its own customers in a fleet of 15 trucks, mostly operated by 9 "jobbers" who own their own vehicles. It is delivered as far away as Quesnel, Williams Lake, Prince George, Prince Rupert, the Sunshine Coast, Vancouver Island, the Gulf Islands and Nelson. Large refrigerator lines (e.g. Northern Interior Transport) carry Avalon milk once a week to the outlying areas.
- A company called **Encore!** in Richmond, California washes 9 million wine bottles/year for reuse. The operation began on a garage scale, grossing less than $100,000 in its first year of operation. Since then, the 36 employees handle about 300 tons per month of wine bottles and generate about $3 million in annual revenues. The company is located within a few hours drive of most of California's coastal wine districts. About 65% of the company's wine bottles come from wineries, while the remaining 35% come from recycling centres. About half of the state's wineries buy from or sell to Encore! on a regular basis; the rest do so sporadically. A winery saves about 60 cents/case, but is also paid 78 cents/case ($120-$130/ton) by Encore! for the dirty bottles — on an annual basis that translates to enough to pay for 30-40 tons of grapes.

Glass - Crushing/Intermediate Processing

Description

- Contaminants are removed and glass is crushed to meet a range of specifications in terms of cleanliness (the absence of contaminants such as bottle caps, labels and other non-glass materials) and coarseness (ranging from a fine powder to coarse glass chunks) so that it can be used in a variety of industrial applications (e.g. aggregate substitute for roadbeds and backfill, sandblasting medium, feedstock in the production of products such as foam glass block, etc.).

Feedstock

- used container glass
- flat glass

End Products

- glass particulate ranging from a powder like substance to 3/4" pieces

Options

- A business could be established as an intermediate processor of glass materials, ideally in an area where there exists a number of companies that are able to use glass as a feedstock in their manufacturing processes.
- Glass crushing may be integrated into a more diversified material processing operation that handles several different waste materials, such as metals, fibre and plastics.

Examples

- **Hill Abrasives** in Ontario, New York, is an example of a company that performs an intermediate processing function and then sells various grades of crushed glass to other manufacturers for use in their processes. The company began operation in June 1991 with one production line. It makes extremely fine particles for abrasives, using bottle cullet as a feedstock. The glass is then sold for use in building and wall cleaning, metal cleaning, sandblasting, cleaning or deburring stamped metal to remove unsmoothed metals on the surface, water filtration media, and ornamental uses such as aquarium gravel. Expansion plans include growing to three lines, one producing abrasive from clear bottle cullet, another from mixed cullet and a third from used ceramics from high voltage electric transmission lines. Each line would process 300-500 tons/year and cost $150,000 for equipment, plus about $50,000 for miscellaneous investments. The plant would employ 14 people, including 9 manufacturing jobs and 5 administrative, marketing and sales personnel.
- **Andela Tool and Machine Inc.** in Richfield Springs, New York, manufactures a glass pulverizer that makes glass particles the size of sand. The glass particles are then sold to companies that use them as filter media, construction aggregate, filler for asphalt, drainage and erosion control, and beach reclamation.
- **The Vitreous Environmental Group** (Quick as a Wink) in Delta, British Columbia, manufactures the Glass Blaster — a machine that turns bottles into soft-edged, custom-sized sand for construction, sandblasting and road paving, as well as more decorative uses. The machine processes at a rate of 500-20,000 lbs/hour, producing a mixture of granule sizes from 1/8" to powder.

Glass - Crushing and Recycling into New Glass Products

Description

- New glass products can be made by either pressing or blowing waste glass.
- In glass pressing processes, molten glass is pressed in a mould (an upper and lower form made of bronze or sand). Pressed glass includes many different products such as tiles, blocks and plates, kitchenware, tumblers and art objects.
- In glass blowing processes, molten glass is gathered on blow pipes and blown by mouth into desired shapes. Blown glass includes art and functional objects such as vases, glasses and kitchenware.
- Pressed or blown glass operations produce a wide range of specialty products, often very high in value. These products are typically marketed on a national or international scale, and plant location is of minimal importance.
- These types of operations do not represent a significant market for post-consumer glass.

End Products

- blown glass (art objects and functional objects such as vases, glasses and kitchenware)
- pressed glass (products such as window and floor tiles, stained glass, blocks and plates, kitchenware, tumblers, art objects, jewels and beads)

Options

- Production can be done by hand, semi-automated or fully automated. The companies involved range from small garage-scale producers (e.g. 200 lbs./day) to large corporations operating at several hundred tons/day. In most cases, however, products are made by hand with basic equipment such as ladles, shovels, simple molds and homemade day tanks (i.e. furnaces).
- Equipment costs for a 300 lbs./day, hand blown glass producer range from $11,000 to $45,000. A semi-automated pressed glass product manufacturer (10 tons per day (TPD)) would incur equipment costs of about $1.8 million.

Feedstock

- The feedstock for pressed and blown glass includes waste figurines, bowls, and other glassware, as well as container glass, although container glass may require the addition of ingredients such as soda ash and limestone to make it more workable.
- Glass should be colour-separated and sourced from one location, to keep variations in batch composition within an acceptably consistent range. Pressed glass has the greatest tolerance for variations in batch composition.

Examples

- The **Stoneware Tile Co.** in Richmond, Indiana manufactures several high-endurance tile products. All tiles have a minimum of 73% recycled glass content. The company buys glass throughout the country from Bassichis (an intermediate processor) which can ensure glass with very low levels of contamination. The plant employs 26 people and uses 44,000 lbs. of waste glass every six days in production. The average tile is priced at $5/sq. ft. Annual sales are about $2.2 million.
- The **Chicago Art Glass and Jewels Factory** manufactures stained glass and glass ornaments. The company is piloting a concept where bottle cullet will be crushed and pulverized, and used in six products: stained glass (40-80% cullet), blown glass, pressed glass, glazed terrazzo tiles, jewels and beads, and a concrete additive. The plant will employ 3 people/shift and process about 40 tons/shift (current capacity is about 3 TPD). If all six products are manufactured, 15 new jobs will be created.

Glass - Direct Application of Crushed Glass

Description

- Glass that has been crushed to various specifications is used directly, with no further processing, in a variety of applications as a substitute for more traditional bulk materials. Examples of common applications include reflective paint, sandblasting, backfill, geotextile sleeves, building blocks, glassphalt, and electromagnetic filtering. Local regulations will affect the suitability of some of these applications. In the United States, crushed glass aggregate has been approved by the National Standards Plumbing Code for use in storm drain construction.

Feedstock

- The primary feedstock is crushed glass, processed to a wide range of specifications from a powder like substance through to 3/4" pieces of glass. Although container glass is the most common feedstock source, some of the aggregate uses can accept other forms of waste glass. For example, reflective paint is made most often with recycled plate glass (i.e. window glass).
- Some other applications can accept materials other than glass, for example geotextile sleeves can be made from crushed ceramics as well as glass.

End Products

- **reflective paint:** glass (usually plate glass) can be crushed and processed into highly reflective glass beads (small spherical glass particles) which are used in the production of reflective highway paint.
- **electromagnetic filtering:** crushed glass is used as a water filtration medium to replace sand, and is effective at cleaning swimming pools and drinking water.
- **sandblasting/industrial cleaning:** glass can be used as an abrasive for cleaning or preparing surfaces for painting or treatment, replacing the chemicals and sand traditionally used for these purposes. Scrap container glass ground as a fine abrasive does a superior job with fewer problems for worker health and the environment. (Sand has been banned for this use throughout Europe as a cause of silicosis).
- **backfill/aggregate in construction sites/roadbed:** according to the Ontario Ministry of Transportation, 5-10% glass aggregate may be used in granular B subbase (crushed to 3/4"). The Region of Durham in Ontario has used glass as a substitute in road construction since 1991. In the U.S. crushed glass aggregate (3/4") has been approved by National Standards Plumbing Code for use in storm drain construction.
- **geotextile sleeves:** geotextile sleeves filled with crushed glass can be used to replace perforated plastic pipe for various drainage applications such as road underdrain, building foundations and parking lots. The feedstock is mixed cullet, including plate glass and ceramics in addition to container cullet. Reasonable levels of contaminants are acceptable. The sleeves can also be used to control erosion and have the advantage of being reusable, while alternatives such as straw bales and silt fencing are not.
- **building blocks/foam glass:** recycled cullet is combined with calcium carbonate foaming agent and bentonite clay to form a rigid, lightweight mass that can be drilled, sawed and nailed in much the same way as wood or gypsum. Foam glass has a high insulation value and is fireproof. The manufacturing process is highly tolerant of contaminants. Foam glass plants must run 24 hours, 7 days/week to retain heat levels, and can use almost entirely recycled cullet, if a consistent supply is available.
- **glassphalt:** this involves using processed glass as an aggregate substitute for stone or sand in the surface layer of roadways. The glass is ground to the consistency of 3/8" or smaller and mixed with crushed stone at a rate of 10-40%. The process can consume 60 tons of cullet/lane mile. Glassphalt is more suitable for low speed roads and other areas e.g. parking lots. New York has been using glassphalt for four years. Many demonstration projects exist, but there is as yet no data on long term performance.
- **other products:** this includes golf traps, beach erosion, supplement road sand in winters, ornmental uses (aquarium gravel), etc.

Glass - Direct Application of Crushed Glass

Examples

- **Glass Aggregate Corp.** in Grand Rapids, Michigan produces a patented device called an R.E.D. (Reduced Environmental Damage) Pak. A 6" in diameter and 40" long geotextile sleeve is filled with crushed cullet. The geotextile sleeves are then used as erosion control devices in construction projects (to catch silt and other run-off) and as underdrains in roads, building foundations and parking lots to replace perforated plastic pipe. The glass underdrain reportedly allows a better water flow rate than sand and is priced competitively with plastic pipe, but will not clog or collapse like a plastic system. Compared to conventional erosion control devices like straw bales and silt fencing, it has the advantage of being reusable. The equipment needed to manufacture the sleeves includes a conveyor, a fork truck, a bobcat, hand stitch sewing machines, and a glass crusher. The feedstock can be mixed cullet, and can include plate glass and ceramics as well as bottle cullet. Contaminants (e.g. bottlecaps) do not adversely affect performance. Two full time employees can make 60-80 units/hour and a year round operation will consume between 2,448 and 3,264 tons of cullet. The company is looking to set up franchises.

- **Potters Industries**, located in Parsippany, New Jersey, produces highly reflective glass beads (micro-sized spheres) used in highway paint. Their feedstock is most often recycled plate glass, which they obtain from Canadian flat glass manufacturers through a Canadian broker who can guarantee consistent amounts of contaminant-free glass.

- **Johnson Systems** in Aurora, Illinois developed an electromagnetic filtering technology using glass cullet. The glass cullet can hold a static electric charge, which allows a high percentage of particulate removal (the system can filter out materials larger than 0.5 micron). "Puris" can be made from crushed post-consumer food grade bottles; the angular fractured nature of the glass allows for a tight filter which can last up to 10 times as long as sand. Johnson prefers to take the glass as whole bottles to monitor contamination. A trailer unit with one filter uses one ton of recycled bottles. The filter technology can be used to filter water in swimming pools, and has recently been used for primary raw sewage sludge removal in Knoxville, Tennessee. Another contract was recently signed with the Port of Seattle to use the technology to filter runoff from airport runways and the company anticipates doing a number of municipal filtration projects in California.

- **ETL** in New Westminster, British Columbia has locally marketed 3,000 tonnes of beneficiated glass which was used for drainage in high rise construction projects. The City of New Westminster is considering using crushed glass in the foundation under the city's sidewalks. ETL says the cost of using the crushed glass is less than the cost of sand, as long as the distance to the site does not exceed 3-5 kilometres.

- **Gagnon & Sons Enterprises** in Timmins, Ontario, is collecting glass, crushing it and using it for sandblasting metals.

Plastics

ASTICS
TURING IN
SE ZONE

Recycling Company (CRC)
an operating a facility
turn recycled mixed plastics
calls Recycled Plastic
RPMs). The 60,000 square
as a capacity of 45,000
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rojects. First year sales
d to be $900,000, reaching
in the second year.

'Greening' of plastics;

Using Recycled Plastics

CARPET FROM SODA BOTTLES

It looks and feels like any other carpet—you would never know the softness in the fibers comes from soft drink bottles. Image Carpets Inc., of Armuchee, Georgia, uses 50 million pounds of postconsumer polyethylene terephthalate (PET) in its manufacturing operations. The carpets are made from polyester, which is PET in a different for

Recycled plastic lumber producers continue to grow in number.

ASTICS RECYCLING

Turning plastics into profit

Wh

o • PLASTICS NEWS October 19, 1

Post-consum

ichael Lauzon
S NEWS CORRESPONDENT

Borland expects to buoy
pany's sales with Enviro
product designed to ap-
the environmental con-
f recreational boaters
Float is a rotationally
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dary flotation system
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Plastics (
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ties lift dock float

INDUSTRY
APES UP
FOR RECYCLED
PLASTICS

0 Million Market

& Sullivan, New York City, predicts 194.5
growth for the recycled plastic market by 19
report "The U.S. Market For Recycled Plastic
market research firm placed the size of the mark
00.9 million. It reported a market of $1
995 a

PLASTICS COLLECTION

Lumbering along: the market for recycled plastic profiles

stic recycling sees new technolo
ventures and expanding marke

If we are to successfully incorporate plastic into recycling programs, we must clearly understand how they differ from other recyclables and consider innovative methods.

Recycling agricultural plas

Recycling agricultural plastics, n
infancy, has great potential for re
ing large amounts of plastics. Fo
stance, approximately 8 percent o
non-packaging low density polyethyle
(LDPE) film is consumed by agricultur
Agricultural plastics include greenhouse,
mulch, overwintering and fumigation
films, as well as nursery pots, packs,
flats and containers. All of these prod-
ucts add up to a large mixed bag of
resins and forms.

Uses PET

bottles are being recycled into
arts for use by Ford Motor Co.
arborn, Mich.). Polyethylene ter-
thalate (PET) resin is manufac-
d from recycled soft drink bottles
ined with 35% glass
the plastic. A

COMMODITIES FOCUS
PLASTICS
MARKETS

Building a new industry of

Plastics - Overview

Definition

- Plastics are derived principally from petroleum-based chemicals. They are commonly divided into two groups: thermoplastics and thermosets.
- Thermoplastics, which comprise about 80% of post-consumer plastic waste, can be reheated and reshaped repeatedly. Examples are polyethylene terephthalate (PET) used in soft drink bottles, high density polyethylene (HDPE) used in milk and juice jugs, low density polyethylene (LDPE) used in packaging film and plastic bags, polypropylene (PP) used in margarine tubs and battery cases, polyvinyl chloride (PVC) used in vinyl siding and food packaging, and polystyrene (PS), which is commonly known as styrofoam but is also produced in a clear, rigid form.
- Thermosets cannot be reheated or remolded without degrading the resin. They are commonly used in insulation, adhesives and car parts.

Current Market for Blue Box Materials

PET and HDPE

- In Ontario, most PET is sold to Twinpak, which sells the material to Wellman, Inc. in South Carolina for processing. The current price is $165/tonne. Recycled PET is used in a wide variety of products, ranging from carpets to car parts.
- HDPE containers recovered in Ontario are mostly sold to DuPont and Resource Plastics. The current price is $100 - $150/tonne. HDPE is reprocessed into pellets and marketed primarily through Dow and DuPont to companies like Lever, Colgate, Esso and Shell for incorporation into new bottles with recycled layers or recycled content. Some HDPE is used as feedstock for garbage bags, sheet plastic, injection moulding applications and overwrap film.

Plastic Film

- Plastic film is reprocessed by Resource Plastics in Brantford and Polychem in Quebec for use in products such as garbage bags. Plastic film reprocessing capacity has grown significantly. The current price for film is $44 to $88/tonne.
- Market demand is emerging and will grow in response to increased end market demand for use of recycled resin in products.

PS

- Several Ontario municipal recycling programs send PS to the Canadian Polystyrene Recycling Association (CPRA) facility, as do several IC&I locations. Market demand is strong. Current price is $88/tonne.
- Recycled PS is converted into office products, gardening trays and compact disc holders.

Wide Mouth Tubs

- Plastic dairy tubs, such as yogurt and ice cream, comprise the resin types HDPE, LDPE and PP. They have only recently been separately collected in Ontario for reprocessing and the industry has yet to develop a material specification and appropriate applications for the tub material.
- Resource Plastics and Dupont have purchased plastic tubs from Ontario communities for researching potential applications. The tub material has been processed and used in the production of products i.e. plastic crates, boxes, cases, pallets and lumber. Testing of the product applications is underway.
- Demand should begin to grow given the successful tests to date on potential uses for this recycled resin.

Plastics - Overview cont'd.

Issues/Trends

- The development of more efficient and/or cost effective technology is needed for collecting, sorting and use of post consumer resins.
- Increased market demand for post consumer resin in products/packaging is required to keep pace with the growing supply of recyclable plastics.
- Consistent volume and quality of plastics is required to compete with virgin resin prices.
- The development of alternative uses for mixed plastics or lower quality plastics is required to expand markets for plastics.

Reuse/Recycling Processes

There are three main opportunities for reusing or recycling waste plastics:

Reuse

- Certain specially designed plastic containers (e.g. General Electric's "Lexan" bottles) can be refilled and used for their original purpose.

Substitution for Virgin Resins in Plastic Products Manufacturing

- Clean, single-resin waste plastics can be processed and used as a feedstock in manufacturing plastic products. Post-consumer, single resins, if they are clean and uncontaminated by other resins or other materials, can be used to produce 100% recycled content products, or blended with virgin resins.

Production of Mixed Plastic Products

- Mixed plastics (i.e. plastic waste containing two or more resins) are used mainly in the production of relatively large, bulky products, where properties such as colour and clarity are not of primary concern. The most common examples are plastic lumber substitutes.
- In most cases, these processes must maintain a feedstock mix that includes 60-70% polyethylene.

Plastics - Reuse

Description

- Certain specially designed plastic containers (e.g. General Electric's "Lexan" bottles) can be refilled and used for their original purpose. Because plastic bottles are unbreakable and much lighter than glass, they are attracting increasing interest from beverage distributors serving specialized niche markets (e.g. schools) as well as mass distribution markets such as soft drinks. Refillable containers require a collection infrastructure that ensures relatively high recovery rates. A refundable deposit may be added to the price of the product as an incentive for container recovery.

Feedstock

- Only bottles that are designed to withstand repeated trips and washing can be used in a refillable system.

End Products

- bottles for soft drinks, juices, milk or liquor products

Examples

- **General Electric** has developed a plastic milk bottle which can be cleaned using the same high-temperature bottle washing equipment that is typically used for glass containers. The Lexan bottles can be refilled 50-100 times.
- **Eastman Carolina** manufactures PET resin which is shipped to France to be used in the manufacture of refillable Coke bottles which are used in Europe, Brazil and Argentina
- **Cochrane Dairies** in Russell, Ontario (near Ottawa) is providing milk in refillable Lexan bottles to the Ottawa School Board.
- **Laesch Dairies,** Bloomington, Illinois, has received a grant from the Illinois Department of Environment and Natural Resources to install equipment to bottle milk in 1/2 pint returnable/reusable Lexan plastic bottles (60,000 units/day) for use in schools. The bottles will carry a deposit to ensure a high return rate.

Substitution for Virgin Resins in Plastic Products Manufacturing

Description

- It is common practice in the production of plastic products to use post-industrial scrap plastic. The use of post-consumer plastics, is growing.
- Plastic products (e.g. containers, packaging, building products, toys, car parts, appliances, etc.) can be made from recycled post-consumer material blended with virgin resin.
- Post-consumer plastics can be separated, washed, flaked or pelletized for use as a substitute for virgin resins.

Feedstock

- Clean, single-resin thermoplastics such as PET, HDPE, LDPE, PVC and PS are required for optimal use.
- Manufacturers may use post-industrial off-cuts or overruns, as well as post-consumer materials from commercial and institutional users (e.g. hospitals, cafeterias, etc.) and curbside recycling programs where material is contaminant free and sorted by resin type.

End Products

- piping
- attic ventilation chutes
- insulation
- eavestrough
- parking lot car stops
- garbage bags
- carpets
- containers
- office supplies
- floor liners
- docks
- pallets
- garbage cans

Options

Intermediate Processing

- The currently available commercial technologies for separating mixed plastic resins are flotation, electrostatic processing, hydrocyclone, and optical sensing. These are expensive and not 100% efficient. As well, a large scale operation is needed to justify costs.
- Processing of plastic resins generally involves manual sorting of resin types, shredding/granulating, washing, flaking or pelletizing.
- If single uncontaminated resin materials can be sourced e.g. HDPE milk jugs, the potential does exist to have a small scale operation that washes and flakes the material for use in plastics manufacturing process.
- The development of cost effective technology to sort plastics could have numerous applications..

Manufacturing

- *Extrusion* (molten plastic is forced through a die) or *injection moulding* (molten plastic is extruded into a mould under high pressure) are the processes that are best suited to secondary granulate.
- *Compression moulding* (plastic is placed in a mould and then melted under pressure to completely fill the mould).
- *Blow moulding* (plastic is melted and extruded into a mould; the molten plastic is expanded with high pressure air to completely fill the mould) requires consistent melting qualities to operate efficiently, and therefore has a lower tolerance for feedstock variation.

Substitution for Virgin Resins in Plastic Products Manufacturing cont'd.

Examples

- **Acrylon,** in Manitoba, manufactures many products from a variety of recycled and virgin resins. Their main product is called Enviro-Float, a floating device which is installed underneath docks. The outer skin, a 4'x2'x20" box, is made from 100% post-industrial polyethylene; the interior is filled with 2 litre PET soft drink bottles. The PET bottles come from recycling programs as well as from volunteer groups, such as the Boy Scouts, who collect the bottles for Acrylon at five cents a piece. The PET bottles are cleaned, the air is sucked out and then each bottle is sealed. 80 PET bottles are stacked into each unit through a hole which is sealed afterwards. The company has sold over 2000 flotation devices. Ontario is their primary market; the docks are sold throughout the province with a 10 year warranty. The product is slightly more expensive than comparable products, but offers an environmental benefit (waste reduction) and is claimed to offer higher quality. Acrylon might consider licensing the process of cleaning and repressuring the PET bottles to an outside company.
- **Triathlon Carpets,** Mississauga, Ontario, manufactures and sells 18 different styles of carpet with face fibres or yarn made from 100% recycled plastic PET bottles. Their main supplier of recycled fibre is Wellman in South Carolina. The carpets contain 70-75% recycled PET, by weight, and are priced 10% less than comparable Stainmaster products. They are considered high quality and more stain-resistant than virgin yarn.
- **Terra Poly Products,** North Bay, Ontario, extrudes plastic sheeting to make a line of office products, including binders, file folders and hanging folders. The company started production in fall of 1991. Terra Poly uses some recycled plastic, including rinsed saline and ketchup bottles from the North Bay Hospital, surplus pipes from a local pipe manufacturer, and some post-consumer milk jugs from Southern Ontario and the U.S. The company also buys off-spec materials, production overruns and other industrial scrap. The only requirement is that the plastic is identifiable in terms of resin type and density. Terra Poly hopes to eventually use 100% recycled feedstock. The company is currently producing at 20 tons per month with 16 employees, and has significant potential for expansion.

Other Recycled Plastic Products

- **Kent Plastics** of Bleinheim, Ontario, manufactures heavy-duty floor liners for use in livestock barns, dumptrucks and other applications from 100% recycled HDPE.
- **Embrace Systems Corporation,** Buffalo, New York, makes an insulation material from PET. It is a wool-like material that looks like fibreglass, but is made of 70% recycled post-consumer PET.
- **DuPont/Vexar Fencing** of Whitby, Ontario, has been using both post-consumer and post-industrial plastics in the manufacturing of fencing.
- **Graham Packaging,** Ontario, is the first Canadian company to introduce the tri-layer bottle incorporating post consumer plastics. Bottles containing PCR are used by Shell Canada, P&G, and Lever Bros.

Production of Mixed Plastic Products

Description

- Several technologies are available for manufacturing mixed plastics into new multi-resin products. This represents a form of plastics manufacturing that is potentially very important to recyclers, given the practical difficulties associated with sorting mixed waste plastics by resin type.
- Most product development to date has focussed on lumber substitutes for outdoor applications such as fences, docks, benches, playground equipment, etc. Plastic lumber can be used in applications where resistance to attack by water, insects, fungi, animal wastes, weathering etc. make it a suitable alternative to conventional pressure treated wood. These appear to be markets with good long term potential, provided that more traditional products can be matched in terms of price and quality.

Feedstock

- These processes typically rely upon HDPE, LDPE and PP as major feedstocks. Mixed plastics production must maintain approximately 60-70% polyethylene.
- Relatively high levels of contamination by other non-plastic materials (e.g. paper labels, coatings, metal lids, etc.) can be tolerated.

End Products

- benches
- car stops
- curbs
- docks
- fences
- landscape timbers
- lumber
- pallets
- patio stones
- pilings
- posts
- speed bumps
- tables

Other Producers of Plastic Lumber:

- **Look 'n Like Wood,** Oakville, Ontario. This company distributes plastic lumber across Ontario. The product is called ReSource Lumber and is manufactured from 100% post-consumer recycled HDPE. It can be used for decks, docks, fencing, etc.
- **Eaglebrook Products Inc.,** Chicago, Illinois, produces Durawood, an HDPE plastic lumber used to make picnic tables, park benches, trash bins, recycling receptacles and playground equipment.

Examples

- **Plas-Re-Tech,** Lindsay, Ontario, is now consuming 5.3 million lbs./year of mixed post-consumer and post-industrial scrap to make plastic lumber. They process mixed plastics into docks, decks, picnic tables, pallets and skids. Customers include Parks Canada, which is using the product to build a boardwalk in Point Pelee National Park.
- **Obex Inc.,** Stamford, Connecticut. This company accepts mixed clean plastics collected from nurseries and garden centres in the Northeastern U.S. Retail customers are encouraged to return their used plastic nursery supplies to a collection bin. The containers, along with greenhouse film and other plastic greenhouse supplies, are shipped to Obex where they are made into plastic lumber called NovaWood. Obex then produces backyard compost bins from the plastic lumber. The compost bins are marketed at garden centres and nurseries to the same people who brought in their waste plastics.

Fibre

SEPTEMBER 1

RECYCLING TIMES

NP Makes Better Bedding, Midwest Research Shows

By David Ramsay

As rural areas across the country
ntinue to have difficulty finding mar-
ts for their old newspapers (ONP),
searchers are finding more reasons
hy they should use it for animal bed-

cow stalls, while straw was used in an-
25 stalls.
ed ONP suppressed bacte-
nificantly as compared
bedding. The bond
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material than straw.

Less material needed

Recent research at the Unive
Minnesota at Waseca showe
took only 80% as much par
straw to maintain the sam

areas—and much cheaper than wood
chips or saw dust. Overall, studies have
shown a 25% to 45% cost savings, de-
ding on the paper market.
suggested that farmers use
equipment to process
chopped ONP fits

Insulation Market Heats up ONP Demand

Ore. Partners Seek Plant Site To Make ONP Building Board

By Michael Misner

Two Oregon entrepreneurs are
claiming success in making structural
building materials from 100% post-
consumer old newspapers (ONP)
Earth Partners, Inc. (Baker City,

boards
Chedester and his partner, Ron
Pratt, worked on the product for two
years and spent about $400,000, but
the result is better than particle board,
Chedester said. "We surpassed all
ANSI (American National Standards

THE MANY FACES OF PAPERMAKING

New Market For Old Newspapers

East Providence, R.I. —
mated 50 million newspap
would be otherwise dumped
landfill will be used by Hig
merican Corp., East Provid
R.I., to create Gypsonite, a gyp
berboard. Gypsonite is a hom
neous mixture of gypsum and ce
ose fibers. The source for the c
ulose fibers is old newspapers.
Besides old newspapers, the com
pany will use natural gypsum, a
mineral found in most parts of the
Highland American also

NEWSPRINT

A Virginia company manufactures a line of products, using preconsumer and postconsumer newspapers, and recycled phone books.

SHREDDED PHONE BOOKS RECYCLED WITH BREWERY SLUDGE

THE VERSATILITY of recycling approaches for old phone books was amply demonstrated in a project that began last fall at the Anheuser-Busch composting

RECYCLING TIMES

ld Newspapers, Phone Books Can Be Used to Absorb Oil Spills

By Susan Combs

American Cellulose Manufacturing
Company (Minonk, Ill.) is turning old
newspapers (ONP) and old telephone
books into an oil absorbent.
American Cellulose, a 16-year-old
company, primarily makes cellulose in-
sulation, but it found that it needed to
diversify, said John Lohr, the compa-
ny's vice president.

waste paper into small pieces, Lohr
said. The material is then put through
a crumbling process
"A broken down pellet with all
fibers exposed is highly absorb
Lohr said.
The absorbent product
as a loose particulate, in
booms, Lohr said. Booms

MULCH MARKET

RECYCLING REVOLUTION I THE PAPER INDUSTRY

Fibre - Overview

Definition

- Fibre includes old newsprint, old corrugated containers, boxboard, office paper (fine paper, ledger, etc.), old magazines, telephone directories and catalogues, and "junk mail."
- This section focusses on products made from waste paper, and particularly on those products that are suitable for small and medium-scale manufacturing.
- Waste paper is generated by post-industrial sources (off-spec and overrun material from printing and publishing industries, etc.) and post-consumer sources (retailers, blue box, offices, etc.).

Current Market

- Fibre recycling is common practice within the pulp and paper industry. Traditionally, most fibers came from post-industrial sources (e.g. off-spec products, cuttings, overruns, printing industry, etc.). Although recycling of post-consumer fibre has also been done for many years, the growth in residential recycling programs has created much larger supplies in recent years.
- The traditional markets for fibre are large-scale paper mills which "close the loop" by recycling the paper fibre into the original end product (i.e. new newsprint out of old newspapers or corrugated medium out of old corrugated containers) or a lower grade of paper (i.e. tissue out of fine papers etc.)

Old newspapers (ONP)

- There are four large de-inking mills in Ontario: QUNO Corporation, Atlantic Packaging, Canadian Pacific Forest Products, Spruce Falls).
- The current price is $32/tonne baled and uncontaminated. This is expected to rise to $60/ tonne by the mid-1990's.
- De-inking capacity has increased dramatically in recent years and will continue to increase. This will increase demand from mills and prices for ONP, and may lead to supply constraints in some cases.
- Many ONP suppliers have long term contracts with large end markets (i.e. paper mills).

Old Magazines (OMG)

- The major markets in Ontario are Canadian Pacific Forest Products, QUNO Corporation and Atlantic Packaging. Many of the new de-inking facilties require 30% OMG to make newsprint.
- The current market price is about $25/tonne. Some markets are accepting OMG mixed with ONP at prices quoted for old newspaper.
- Recent increases in demand are due to increases in de-inking capacity.

Old Corrugated Containers (OCC)

- The major markets in southern Ontario include Sonoco, Atlantic Packaging, and Domtar (90% of recovered OCC is purchased by manufacturers of containerboard, linerboard, and paperboard).
- The current price is $25-30/tonne. Prices are increasing.
- Major expansions of recycling capacity for OCC are planned in Ontario (Domtar and MacMillan Bloedel).

Fibre - Overview cont'd.

Current Market cont'd.

Boxboard

- Markets are emerging. There are two Ontario mills, Cascades Paperboard and Strathcona accepting boxboard. Other mills are conducting tests to determine feasibility. (Hot melt glues, adhesives, coatings, etc. cause problems in processing of post-consumer boxboard.)
- The current price is $20/tonne.
- Pilot projects are currently investigating composting as a potential end use.
- Feasibility studies are underway to test the potential for converting boxboard into ethanol, an alternative motor fuel, and building products.

Fine Paper

- The traditional end uses for fine papers (computer print out paper (CPO), and white and coloured ledger) are tissue mills and to a lesser extent fine grades can be used as a feedstock for:
  - — fine paper containing post-consumer fibres;
  - — linerboard for corrugated containers;
  - — paper liner for drywall;
  - — boxboard;
  - — molded pulp products;
  - — as a strengthener in the production of recycled newsprint.
- Although prices do vary, in general prices paid for fine paper grades are the highest of any of the recycled fibres. CPO prices are approximately $140 per tonne and for white and coloured ledger $140 and $110 per tonne respectively.

Mixed Paper

- Mixed paper consists of all grades of waste paper, from old newspapers to fine paper. Mixed paper is by definition unsorted; however it may be sorted into its component high grades (CPO, white ledger and coloured ledger) and low grades of paper (ONP, OCC, boxboard, OMG).
- Typically, mixed paper is used to make boxboard and construction paper products. Asphalt-coated roofing felt and the paperboard lining of gypsum wallboard have traditionally provided a major outlet for mixed paper. Manufacturers of corrugated medium also use a small portion of mixed paper. Typically, prices paid for mixed paper are very low, ranging from $0 to $25 per tonne. Sometimes it is necessary to pay a tip fee (usually less than $10) to get rid of mixed paper (still an attractive option compared to landfill disposal charges).

Fibre - Overview cont'd.

Reuse and Recycling Processes

- There are three basic opportunities for reuse/recycling industries using waste paper:

Handmade Paper and Construction Boards

- A discussion of the opportunities for manufacturing of non-standard paper products (such as handmade paper) and miscellaneous construction boards will be provided. Standard paper production will not be discussed (e.g. the production of writing paper, tissue, cardboard, roofing felt). The manufacturing processes required for standard paper products are generally costly and complex, involving pulping, sheet-forming and conversion to final form. The production of these standard paper products is rarely feasible on a small-scale, due to high capital costs and the need for high volumes to achieve economies of scale. The industry is dominated by large vertically integrated companies with market control advantages.

Moulded Paper Products

- Moulded paper products typically include egg cartons, nursery pots, and other forms of packaging. These markets are currently dominated by a few large packaging corporations. However, small-scale manufacturing is feasible in cases where a market niche can be identified for relatively high value end-products.

Dry-Process Products

- Included in this category are paper products made by processing waste paper without pulping (e.g. animal bedding, hydroseed mulch). Nationally, these products do not represent a large market relative to other paper products, but they are well-suited to small-scale production if local markets can be identified.

Fibre - Handmade Paper and Construction Boards

Description

- Specific market niches or opportunities to manufacture paper or construction boards that do not require the high capital and high output associated with standard paper production will be the focus of the discussion in this subsection.
- A scan of non-standard paper production activities reveals some success stories with small-scale manufacturers which secure a market niche (i.e. making custom products on request, producing small orders to meet a specific customer's needs) or develop some kind of working relationship (integration) with a large company (co–operation and/or partnership)
- Manufacturing of construction grades is also feasible as a small-scale operation. Markets for some of these products (such as fibreboard) have potential for small scale manufacture because they can use high percentages of low grade waste paper (including OCC, ONP, mixed grades and magazines), and because markets for the product can be expected to grow as governments and the public move towards use of recycled products for construction. Building products require many tests to ensure standards for strength, fire retardancy and performance are met.

Feedstock

- Virtually any type of clean, post-consumer or post-industrial scrap paper can be used. Common feedstocks include various combinations of old corrugated containers, fine paper, junk mail, white ledger and coloured ledger.
- The specific feedstock mix is generally determined by the characteristics of the final product.
- Feedstock quality control is very important, and may be a key factor determining production costs.
- The feedstock for construction grades is typically about 45% recycled paper.

End Products

- specialty paper (stationery, wedding invitations)
- decorative wall coverings
- packaging paper
- construction grades
    - fibreboard
    - insulation board
    - roofing
    - siding
    - flooring

Examples

- **Flowers of France** is a French producer of handmade paper products that are distributed in Canada by Paul Boucher. The product is a high quality stationery featuring pressed wildflowers. It is made in France by a number of independent artists working from their homes. An entrepreneur has organized these producers into a decentralized network. Flowers of France are sold through retail stores and through distributors in Canada, the United States and Italy. Greeting cards from the Flowers line are currently selling for $5.50 each in Toronto. The company is also producing decorative wall units made from the same paper.

Fibre - Handmade Paper and Construction Boards cont'd.

Examples

- **Sierra Tissue** of Southern California is a successful, small-scale manufacturer of packaging paper. The 16 TPD facility uses lower quality waste paper grades. The company, which owns a recycling collection operation as well as a company that purchases the packaging paper, benefits from vertical integration.
- **The CanFibre Group** in Vancouver, British Columbia, has exclusive world-wide rights to Canadian technology that can convert dry waste in the form of wood, cardboard, paper drink containers and even non-de-inked newspaper into high quality manufactured wood products such as medium density fibreboard (MDF). These products are used in the production of furniture, kitchen cabinets, mouldings, baseboards and a variety of value-added manufactured goods. CanFibre is in the midst of constructing a $35 million plant in Toronto, while evaluating future sites in the U.S. and throughout the world. CanFibre is able to produce a product at a cost advantage of up to 45% over standard MDF producers.
- **Insul-Tray Inc.** in Redmond, Washington, manufactures panels from 100% recycled post-consumer corrugated cardboard. The panels serve as borders to cavities in houses that are filled with cellulose insulation. A three-storey house consumes 15,000 lbs. of mixed waste paper when used at the standard density of 3.5 lbs./cu. ft. The company has obtained 33 patents in Canada and the U.S. for different applications and is interested in pursuing a joint venture in Canada.
- **Celotex Corporation** in Michigan manufactures ceiling tiles, or "acoustical ceiling board" using ONP (4-21%) and recovered steel mill slag (30-90%). One of the plants in Illinois operates at a relatively small scale of 40 TPD in a rural area 380 miles north of Chicago and all markets. Two hundred employees work at the plant.
- **Pan Terre** (earth panel) is a multi-purpose wallboard product developed in Belgium and currently sold in the U.S. through a distributor in Washington, D.C. The board has acoustical and thermal insulating properties and can be manufactured out of equal parts of low grade waste paper (OCC, ONP, magazines, junk mail) and agricultural waste (such as wheat straw, rice husks, and peanut shells). Pan Terre is used in Europe for interior renovation, modular construction, ceilings, acoustical structures for studios, and soundproofing enclosures for industrial machinery and office partitions. Two plants in Europe are currently using about 7,000 tonnes of mixed paper/year.
- **Gridcore Systems International** in Carlsbad, California, was recently awarded a property license to manufacture products using GRIDCOREš technologies. GRIDCOREš panels can be made from recycled wood, mixed paper, OCC, some plastics and many other materials for use in stage sets, construction, furniture, arts and crafts, industrial and other applications. The company's first GRIDCOREš panel production facility is scheduled to be in operation by fall 1993 at a capital cost of $1.5 - 2 million (U.S.). At first, the plant will consume about 1-3 TPD of OCC and mixed waste paper, and later will expand to a capacity of 7-8 TPD. The proposed plant would employ from 10-20 people.

Fibre - Moulded Paper Products

Description

- In moulded pulp manufacturing, post-consumer and post-industrial feedstocks are pulped, fed through screen moulds, and dried to create rigid products such as packaging trays and containers (e.g. egg cartons, nursery pots).
- Moulded pulp production processes are well known and equipment (new and reconditioned) is widely available. The equipment includes hydrapulpers, tanks, agitators, pumps, air compressors, vacuum pumps, molds, and dry felts, all of which are commercially available. A basic pulp machine can be expected to cost about $1 million, not including moulds, which cost about $12,000 each. A moulded pulp mill with a production capacity of 10 TPD will require a capital investment of about $2 million.
- The moulded pulp production process is much better suited to small-scale production than standard sheet paper products for several reasons:
  - simpler production process;
  - reduced need for automated monitoring equipment;
  - lower capital costs;
  - wide variety of waste paper grades acceptable as feedstocks.
- Moulded pulp production in Canada is dominated by two companies — Cascades Inc. and Canadian Pacific. Cascades in Brantford, Ontario manufactures products such as egg cartons, and carrier trays for the fast food industry. It is the largest producer of egg cartons in Canada.
- Opportunities exist for smaller, economically feasible production facilities if niche markets for higher-value products can be found (these most likely exist in more specialized packaging applications). It is possible to produce specialized products economically at small mills at feedstock rates as low as 1 ton per day. The key to competitiveness is versatility and flexibility — so that small runs and custom-made orders can be processed.
- Annual growth of 20% is projected for the moulded pulp industry.
- The primary barriers to market entry are:
  - Many moulded pulp packages are inherently low-value, unless more specialized applications can be found. Profit margins can be quite low.
  - Moulded pulp products have a high bulk to weight ratio. Long distance shipping can be expensive.
  - The moulded pulp market is currently dominated by a small number of producers operating at a national scale, with major investments already in place and an ability to take advantage of economies of scale.
- Information on relevant environmental regulations is available from Environment Canada and the Ontario Ministry of Environment and Energy.

Examples

- **Milwaukee Pulp Products** in Milwaukee, Wisconsin, processes between 1,000 - 2,000 lbs per shift using recycled newsprint to make containers for the floral and nursery industry, minnow buckets, custom paper packaging, and various toys such as Easter bunnies, masks and Santa Clauses. Built in 1941, the plant is a custom moulding company which can compete successfully for orders as small as 5,000-10,000 pieces per production run. For special customers, the company will do only a few hundred pieces if requested. Moulds cost about $400-500 (U.S.) each. Tom McKee, one of the owners of the plant, estimates that a similar plant built today could cost under $1 million (U.S.) (half for the building, half for the equipment).

Fibre - Moulded Paper Products cont'd.

Feedstock

- Almost any of the common recycled paper feedstocks can be used (e.g. old newsprint (ONP), old corrugated containers (OCC), fine paper, telephone books, mixed paper).
- Moulded pulp processes and products can generally tolerate relatively high degrees of contamination and feedstock variation. There may be opportunities to use low grades of mixed paper that are not acceptable in standard de-inking mills.

End Products

- food packaging (egg cartons, fruit trays, meat trays, pie plates, produce trays)
- food service items (beverage trays, serving tray)
- consumer products (plates, dishes)
- specialty products (floral and nursery containers, agricultural containers, masks, toys, specialized packaging (e.g. cushioning for small appliances and furniture, flexible packaging inserts, etc.)

Examples

- **Fripp Fibre Forms Inc.** of Tisdale, Saskatchewan, produces egg and apple flats at a rate of about 25 TPD. The plant uses a variety of post-consumer feedstocks, including ONP, OCC and telephone books. Fripp is currently selling all over North America, and competing successfully with a number of larger US-based plants. The firm operates in a 3,000 square foot facility, and currently employs 20 people, mostly in production.
- **Molded Pulp Products** in Maine produces about 5-6 TPD of toy, pharmaceutical packaging and cosmetic packaging using a feedstock of old newsprint. The firm employs over 40 people, using 5 people per shift in the plant, and the rest in engineering, R & D, quality control, sales, etc. Roger Baker, the plant manager, estimates that a new plant built today would cost about $1.5 million (U.S.) plus the cost of the building. The plant is able to compete with larger companies because of its versatility in making small production runs and quick response time. The company is subcontracting with a large moulded pulp operation to make packaging pieces in small quanitites for use in a larger packaging assembly.
- **Packaging Corporation of California** operates five moulded pulp manufacturing plants in the U.S. About 95% of the feedstock used is recycled paper, including ONP, post-consumer blank ledger, computer paper, shredded ledger, telephone books and over-issue government publications. The flagship plant in Red Bluff, California has an output of about 150 TPD in products such as egg cartons, pie plates and a wide variety of packaging trays. The Red Buff plant employs more than 400 people.

Fibre - Dry Process Paper Products

Description

- Dry process paper products include those products that are made by processing waste paper without pulping,(e.g. cellulose insulation, animal bedding and hydroseed mulch).
- The markets for dry process products are not large when compared to the markets for other paper products on a national scale. However, dry process manufacturing is well-suited to small and medium scale operations, and it is often possible to identify viable local markets.
- Dry process manufacturing is ideally suited to situations where a local market can be found, and the distances to traditional end markets for waste paper (e.g. standard paper mills) are such that local recyclers can reduce shipping costs by choosing instead to send materials to the local dry process plant.
- Most of the technology and processes involved in dry process manufacturing are relatively low cost. All dry process products can be produced with shredders and/or hammermills.

Feedstock

- Common feedstocks are various combinations of old newsprint, old corrugated containers, junk mail, and fine paper.
- Recycled content in these products can range from 0-100%.

End Products

Cellulose insulation

- Cellulose insulation is made from recycled, organic wood fiber (usually pulverized newspaper) mixed with an inert, non-toxic fire-retardant chemical (usually boric acid), borax, and other compounds. The insulation is typically bagged and sold to contractors who "blow" it into wall and ceiling cavities with an air compressor and a hose.
- Cellulose insulation is well suited to small scale production because of low equipment costs, simple manufacturing processes, and ample supplies of the main feedstock (ONP) in most communities.
- Cellulose insulation must meet provincial and local building standards.
- The growth of the cellulose industry will depend on the ability of the product to compete with fiberglass in new construction.
- Diversifying the product line of a cellulose insulation plant will strengthen financial viability through increased sales and market base.

Hydroseed mulch

- Hydroseed mulch is a mix of fine fibres (either wood, cellulose or a mixture of both), combined with green dye and seed. The product is sprayed on hillsides, along highways and in other landscaping applications (golf courses, abandoned gravel pits, parks, sanitary landfills, playing fields, mining, subdivisions, airports, etc) .
- Recycled content can range from 0 to 100% old newsprint.
- The product typically carries a low price per tonne. Markets must be local.
- Local and state/provincial governments and their contractors are often large users of mulch products.
- This is a highly seasonal product, with most use taking place in the fall.

Fibre - Dry Process Paper Products cont'd.

End Products cont'd.

Animal bedding

- Shredded newsprint can be used directly as animal bedding for cattle, poultry and pigs.
- The use of paper for animal bedding is economically attractive due to current high prices for straw.
- Bedding can use up to 100% recycled content.
- This application is fairly common practice in some farming communities. It is a low value end product; markets must be local.

Other products

- Cellulose fibre products can be used as replacements for asbestos in products such as caulking. Competition is expected to be intense in the near future as the use of asbestos is phased out.
- Cellulose materials have a valuable potential for improving soil properties and reducing sediment loss by surface runoff. Many trials have been conducted to show that a mixture of cellulose and other organic material (poultry industry litter, yard waste, etc.) can increase crop yields.
- Recycled newsprint and other fibres can be manufactured into cat litter.
- Cellulose fibre products can be used as industrial absorbants.

Example

- Community farmers and recyclers in Berks County, Pennsylvania, have used about 152 tons of newspapers as animal bedding. Recyclers drop off waste paper at a centre and prisoners from a nearby jail do the shredding and baling. The animal bedding is purchased for about $30/ton, about half the current price for straw. Many studies have shown the animal bedding to absorb better than straw.

Examples

- **Cellin Manufacturing** in Culpeper, Virginia, manufactures three primary products from old newspaper — cellulose insulation, a custom fibre asbestos replacement, and hydromulch (the company's largest seller). The hydromulch is mixed by the buyer with seeds, fertilizer, and water and is used for large scale planting operations on golf courses, at shopping malls and industrial complexes and on roadways. The primary market for the hydromulch is seed distributors, nurseries and the state Department of Transportation. The local county district uses 300-400 tons per year in road maintenance projects (for erosion control) and the nearby county district office buys 1,500 lbs. of hydromulch at a time for $156/ton. The company uses a mixture of telephone books and 20,000-25,000 tons of old newsprint/year.
- **Thermocell Insulation Ltd.**, in Orleans, Ontario, and Truro, Nova Scotia, manufactures cellulose insulation and hydroseed mulch and sells "specialty fibre" to various manufacturers of construction material (e.g. caulking compound, roofing compounds, etc.). Two plants employ 20 people.
- **Canbrands International Ltd.** of Moncton, New Brunswick, manufactures two products from recycled newsprint and sawdust — Yesterday's News Cat Litter and Leaksorb Industrial Absorbent. Both products are made from over 70% old newsprint. The plant processes about 50 tonnes of newsprint per week and employs 15 people. Canbrands is currently negotiating contracts for manufacturing cat litter in the U.S. and estimates they would need about seven plants (in the U.S.) to meet the demand.

wood waste recovery
and processing.

REE TRIMMERS SEEK
RECYCLING OPTION

Integrating Wood
into the
Recycling Loop

od Waste Finds a Second Home in the Mulch Market

nore manufacturers are find-
uses for recycled materials
nd-uses and demand for wood
ave remained notoriously lim-
An Ohio-based company is
ing this perception, however.
a new technology that transforms
wood into colored landscape
ch

The wood coloring system, which is
rrently being marketed by the wood
ecycling division of Kurtz Bros., Inc.
Cuyahoga Heights, Ohio), consists of
patented, automated equipment that
takes shredded or chopped wood waste
and dyes it to duplicate the look of nat-
ural mulches. So far, different color-
ants have been developed to replace
hardwood bark, cypress, hemlock, ce
dar, and eucalyptus mulches

WOOD WASTE BECOMES ROAD BEDDING

A program sponsored by the Seattle Solid Waste Utility collected 1,200 tons of clean wood waste in 1991, mostly

*From old kitchen cabinets to
tree stumps and pallets,
recyclers find ways to make wood waste
go around one more time.*

WOOD RECYCLING GAINS IMPOR

Re ed Wood-Polymer
Co her

Wood

l recycling
new hope
e reduction

OOD WA
ECYCLING OPTIONS

WHITTLING AWA
AT WOOD WAST

rniture Factory From Recycled Pallets

n year, U.S. businesses buy 500 million pallets, (wooden crate and box supports
d in shipping). If these were stacked on top of each other, they would form a pile
17 miles in the sky, the equivalent of 14,146 World Trade Centers. (1) It amounts

THE DIVERSITY of private companies that are capturing the value of woody debris reflects the diversity of the waste stream itself. Some businesses have gone beyond wood recovery into refurbishing and marketing the fix-

MARKETS FOR WOOD CHI

Angeles, California
KING WOOD WASTE
RODUCERS AND USERS

The Integrated Solid Waste Management Office here has begun to target more than 3,000 of the city's largest wood waste generators in an effort to get more of that material out of ste stream. The Office has alled "Wood You hints audit sors.

BRINGING OUT THE BES
IN WASTE WOOD

n overview of post-consumer waste
wood waste recovery options
epth listing which includes the types of
d, services offered and
esented.

Wood - Overview

Definition

- Harvested wood waste — includes tree stumps, tops, limbs and whole trees resulting from forest management activities and land clearing
- Residues from pulp and paper producers, sawmills, furniture manufacturers, etc. — includes sawdust, veneers, plywood, particleboard and laminates
- Pallet waste (used shipping pallets)
- Construction and demolition (C&D) wood waste
- Other types of wood waste — household yard waste, tree trimmings, orchard prunings, and other wood used in landscaping

Current Market

- Harvested wood waste is typically buried on-site or left to decompose on the land.
- End uses for residues from pulp and paper producers are generally well-established. Many operations burn residues on-site for fuel; others sell or give away sawdust for animal bedding, and wood scraps for residential fuel.
- Pallet wastes are usually stockpiled by industries or disposed of in landfills.
- Wide variations in physical and chemical characteristics of wood in C&D waste make it challenging to find end use markets. High disposal costs and/or landfill bans are supporting more reuse and recycling options.
- Household yard waste, until recently, was left on-site or disposed of in landfills. Yard waste composting has increased in recent years. .

Issues/Trends

- Many Ontario municipalities are moving to ban wood and other construction and demolition wastes from landfill. This is creating new opportunities for waste wood processors, C&D waste exchanges and companies manufacturing new products from wood waste.
- Wood wastes generally must be untreated.

Reuse/Recycling Processes

Reuse

- Wood waste items can be reused for their original purpose. For example, damaged pallets can be refurbished and sold again.

Remanufacturing

- Wood waste can be used in the manufacture of new wood products, such as furniture, toys, backyard composters, etc.

Chipping/Grinding/Shredding

- Wood waste can be chipped, ground, shaved or shredded to produce a material that can be re-sold for use in a variety of applications.

Direct Application of Chipped/Ground/ Shredded Wood

- Chipped, ground or shredded wood waste can be used directly (e.g. as wood chips in landscaping, as a bulking agent for composting, as road bed, or as an absorbant for oil spills).

Use of Chipped/Ground/Shredded Wood in Manufacturing Processes

- Chipped, ground or shredded wood can be used in other manufacturing processes, such as the production of strand lumber, particleboard or insulation.

Wood - Reuse

Description

- Used skids or pallets can be purchased, refurbished and sold again.
- For discussion of reuse of wood building products in good condition (e.g doors, flooring, boards, etc.) see Construction and Demolition Waste section.

Feedstock

- wooden pallets with cracked or broken boards

End Products

- refurbished pallets

Examples

- **Multi-Pallet** in Mississauga, Ontario, employs 25 people in the repair of wooden pallets. The company accepts used pallets from 10 large suppliers, plus several sporadic suppliers. Pallets are picked up free of charge; revenue is generated from resale. Multi-Pallet refurbishes 500,000-600,000 pallets/year. Pallets that are damaged beyond repair are chipped.
- **Pallet Express Inc.**, Palmer Township, Pennsylvania, repaired and sold about 800,000 pallets in 1992, representing $3 million in sales. Used skids are purchased for about $1, refurbished and sold again for $3-$5, which compares with about $10 for a new pallet. The cracked boards removed from damaged pallets are taken to a nearby company that processes them into mulch.

Wood - Remanufacturing

Description

- Wood waste in good condition can be used to make new wood products (e.g. furniture, arts and crafts, backyard composters, etc.)
- Wood products in good condition yet slated for disposal (e.g. building products) can be salvaged and marketed/distributed through reuse centres (see Construction and Demolition Waste section).

Feedstock

- wood waste from trees
- manufacturing scrap
- wood waste from construction and demolition sites

End Products

- furniture
- arts and crafts
- backyard composters

Examples

- **Future Trend Enterprises** in Toronto, Ontario, uses 50 tonnes per week of old pallets from pallet repair companies to manufacture composters. The company is currently unable to keep up with municipal orders for composters, and three staff members are making 400 composters each week. New staff will be hired to help meet the demand. These composters sell for 30% less than the competition. Future Trend has also developed a reusable envelope, and also plans to manufacture paper bundlers and rain barrels.
- **The Hummers**, Austin, Texas, makes a variety of items , including candlesticks, vases and lamps, bowls, hiking staffs, bookends and cedar mothballs. Most of these products are individually crafted art objects tailor-made to the shape of the wood piece. The company uses only wood from dead trees, manufacturing scrap or trees that are cut for some other purpose than direct timber use (e.g. landclearing on farms). The tools to make the objects are relatively inexpensive — lathes, bandsaws, pneumatic sanders, power saws and hand tools. The two-person operation uses about 21 tons/year. For 15 years, the company has built a national reputation and repertoire of products for sale. The company would like to expand to a small shop employing 5-10 people.
- **Really Green Inc.** in Toronto manufactures discarded building materials (e.g. doors, floors, walls, etc.) into coffee tables, wine racks and footstools. (Tables sell for about $195.) The company was founded by a former theatre director and is operated out of the King Business Centre in Toronto. Says Swayze of the company, "we're basically creating a new industry and changing a mindset that has existed for hundreds of years."

Wood - Chipping/Grinding/Shredding

Description

- Wood waste can be chipped, ground, shaved or shredded and sold for use in a variety of applications. It is possible to base a business on the processing of waste wood to meet the specifications of various end users.

Feedstock

- untreated wood waste

End Products

- wood chips
- shredded wood
- wood shavings
- ground wood
- sawdust

Options

Mobile Chipping Operation

- Wood can be chipped with a mobile chipper or grinder at the site where the waste is produced. New mobile wood waste chippers are designed to handle a wide variety of wood waste (including stumps, limbs and whole trees, scraps of dimensional lumber, plywood, doors, window frames, used pallets and wooden containers). Equipment to produce wood chips can range in cost from about $90,000 to $400,000. The equipment for manufacturing wood shavings can cost as little as $32,000.

Permanent Wood Processing Facility

- A processing facility can be constructed to process wood waste. A tip fee is likely to be charged, at a slightly lower rate than those at nearby transfer stations or landfills to provide a financial incentive for waste generators and haulers to separate wood from other wastes. The equipment required will depend on markets, the type of material accepted, and plant capacity.

Examples

- **Waste Conversion Inc. (WCI)**, Region of Peel, Ontario, handles pallets, C&D wastes and trees. Wood must be segregated from other wastes by generators. Wood waste is banned from the Peel Region landfill. The plant receives 120-150 TPD of wood waste for reprocessing to customer specifications. Recycled wood is used for particleboard, shingles, mulch, road base material and composting. WCI's major customer is Domtar Inc. which uses the chips to make particleboard at its plant in Huntsville. Very fine wood is turned into roofing material at Domtar's Thorold plant. Brampton's Parks and Recreation Department uses the fine wood in its flower gardens and a local dairy farmer recently purchased 25 tonnes for animal bedding. WCI charges haulers $85/ton (less than the landfill tip fee) for the wood waste and sells the recycled wood for an average of $28/ton. WCI offers the waste wood recycling technology as a turnkey operation for $3.5 million.

Wood - Direct Application of Chipped/Ground/Shredded Wood

Description

- Wood processed as described above can be used directly.

Feedstock

- wood chips, shavings or shreds

End Products

- wood chips for landscaping
- topsoil conditioner
- mulch
- potting soil component
- bulking agent for composting
- landfill cover
- road bedding
- animal bedding
- absorbent e.g. for oil spills
- wood shavings in potpourri

Examples

- **Natural Products Corp.** in Shippensburg, Pennsylvania. Fascinated by the idea of regional waste exchanges, Natural Products' president and owner Jim Berry, ran an ad in the Northeast Waste Exchange for specific grades of wood shavings to use in potpourri mixtures. The exchange worked and currently he contracts with three different companies for wood shavings that are used in the final product. Excess and odd sized wood chips are used as fuel for heating. Berry also receives wood waste from a furniture manufacturer who was previously paying $275 for trucking, plus a $300 tipping fee to landfill one 40 cubic foot roll-off container of wood pieces in West Virginia. The furniture maker drops his wood waste at Berry's facility, only half way to West Virginia, at no charge. After a shipment arrives, employees separate useable scraps from burnable fuel. The good hardwood pieces are then cut to fit one of several bird house designs. After packaging in colourful, professionally designed boxes with a little bag of nails, kits are sold at the wholesale price of $4.25 each, and ultimately retail in the $7.95 to $9.95 range. Other materials that Berry obtains through waste exchanges include peach pits and cherry seeds from a fruit processing plant, which are washed, processed and used as potpourri ingredients. Natural Products has yearly sales of close to $1 million.
- **Treecycle Inc.** in Denver, Colorado. In 1990, Denver sustained more than $100 million in damage from a hailstorm. Treecycle began to recycle cedar shingles from about 30,000 damaged roofs. Now the business has 11 full-time employees and has collected 150,000 cubic yards of the material. Treecycle charges $4/cubic yard, slightly less than landfill fees. A mulch made from the material sells for about $15/cubic yard. Some of the shingles come in undamaged and are made into birdhouses which sell for $16. The firm also puts out a line of compost bins made from wooden pallet material covered with shingles.

Wood - Use of Chipped/Ground/Shredded Wood in Manufacturing Processes

Description

- Wood can be processed for use in another manufacturing process (e.g. the manufacture of a new building product).

Feedstock

- untreated wood (with one exception; see Microterra in examples)

End Products

- strand lumber (wood lengths, or strands, glued together to form a building product)
- particleboard
- insulation
- rayon

Examples

- **Microterra** in Boca Raton, Florida, is converting treated wood (e.g. utility poles and railroad ties) into chemical free products like pressed wood, masonite and particleboard. Their bioremediation process chips and crushes treated wood, then inoculates it with micro organisms that devour more than 99.9% of the toxins. Microterra's first plant is slated to open in Tallulah, Louisiana, and will be capable of recycling 50,000 utility poles/month. Some utilities pay up to $150/pole to dump in hazardous waste landfills, which is twice what Microterra will charge. Recycled hardwood is a prime component of rayon fabric, which Microterra will also make. A Vermont based national catalog merchandiser has already agreed to buy all of Microterra's rayon.
- **Cascades** in Montreal makes Iso-Fluff, an insulation material manufactured from wood fibre (wood chips from sawmills is used as the feedstock). It can replace fibreglass or rockwool insulation, reportedly with better thermal insulation capabilities since it consists of hollow fibres. It is also good for soundproofing, and has shown no detrimental health effects through inhalation. The technology is fairly expensive to implement and requires high levels of electricity. A viable operation would have to process 175,000 bone dry tonnes of wood chips annually.

Construction and Demolition Wastes

RECYCLING DEBRIS
FROM CONSTRUCTION PROJECTS

struction and demolitio
ste processing:
w solutions to an old probler

n used paving material to wood con-
uction scraps to concrete from de-
olished buildings, the reuse and recy-
ng of construction and demolition (C/D)
aste is a growing industry in the U.S.
nd Canada. Skyro
enforcement crack

DIVERTING
COMMERCIAL
BUILDING
MATERIALS

RECYCLING GYPSUM
FROM C&D DEBRIS

T HE IDEA is simple and practical
— surplus residential construc-
tion material from contractors,
manufacturers and others is do-
a nonprofit agency rather
ndfilled. The donor re-
tax deduction in pl-

Saving the kitchen sink

olition

Constructio
debris —
waste str

struction Products

demolition materials

RECYCLING OPPORTUNITIES
FOR DEMOLITION DEBRIS

Construction &
Demolition

ECYCLING EFFORTS BUILDING

DEMOLITION CONTRACTO
BECOMES RECYCLER

W HAT STARTED out as a
processing site for con-
struction and demolition
(C&D) debris has blos-
somed into a full range
recycling and composting
facility that handles ma-
terials ranging from asphalt and concre-

Vaste roofing shingles will pave city's roads

ampton -- The City of Brampton,

Public Wo

Construction and Demolition Materials - Overview

Definition

- C&D wastes generally include concrete, bricks, asphalt, drywall, shingles, wood, cardboard and plastics. The latter three materials — wood, cardboard and plastics — have been addressed in separate sections of this manual. This section will focus on the remainder of the C&D waste stream.
- Construction waste typically includes drywall, asphalt, shingles and brick, while demolition waste typically includes wood, brick and concrete.

Current Market

- Concrete, brick and asphalt wastes have traditionally been source separated from mixed wastes and recovered. These materials are commonly reused as backfill or subbase material on many construction sites. They are also used as lakefill or as an aggregate substitute in road base construction.
- The recycling of old asphalt in the production of recyclable asphalt paving (RAP) is becoming more established. In 1990, an estimated 1.2 million tonnes of old asphalt were reused as hot mix in Ontario.
- Gypsum wallboard was landfilled in the past, but is now banned from landfill in many areas due to the development of a recycling infrastructure.

Issues/Trends

- As solid waste regulatory requirements have become more stringent, so has the diffiiculty in obtaining required permits for C&D recycling facilities.
- A major constraint to the development of facilities can be public opposition from local citizens concerned over lead, dust, truck traffic, groundwater pollution and other hazards (especially if the project becomes a net importer of waste, rather than a local facility for local wastes only).
- In many jurisdictions, there is a lack of information available to contractors on C&D waste disposal bans and available alternatives.
- Demolition is often completed under strict time schedules, leaving insufficient time for salvage for reuse.

Reuse/Recycling Processes

There are 5 major opportunities for reusing or recycling C&D materials:

Reuse

- Building products in good condition yet slated for disposal can be salvaged and marketed/distributed through reuse centres. Many of these centres are municipal or non-profit ventures, although there are several examples of private reuse enterprise as well.

Processing Source Separated Concrete or Brick for Aggregate

- Concrete/brick can be processed to a variety of specifications for use as aggregate.
- Processing can take place either on-site or at a permanent facility.
- Three grades of aggregate are used for different applications (e.g. road bed, foundations, sidewalks, etc.).
- This material has traditionally been separated and used as backfill, etc.

Mixed C&D Waste Processing

- Mixed C&D waste processing involves sorting mixed waste, and may also include further processing of some of the materials once sorted.
- Mixed waste processing is less common than source separation of C&D wastes. It is generally more expensive to separate items after collection from C&D sources, and the quality is not as high as source separated materials.

Processing Source Separated Asphalt

- Waste asphalt, which is generated when existing paved areas are prepared for repaving (i.e. the top layer of old asphalt is removed), may be processed for reuse in driveway pavement, surface pavement for lower volume traffic routes, roadbase material and for patching potholes. Research and development into the inclusion of waste roof shingles as feedstock is in process.
- Asphalt may be processed on-site or at a permanent facility.

Processing Source Separated Drywall Into Gypsum

- Waste drywall can be processed back into gypsum which can then be sold for a variety of end use applications (e.g. new drywall, cat litter, soil amendment etc.).

Construction and Demolition Materials - Reuse

Description

- Building products and materials in good condition yet slated for disposal may be salvaged and marketed/distributed through reuse centres.
- Reuse centres are most successful when landfill disposal bans are put in place, and new alternatives are required for C&D waste.
- In general, an incentive to participate in C&D recycling (versus disposal) is key (e.g. reduced costs vs. conventional waste hauling, etc.).
- A reuse centre often works well in co-operation with a local community group (e.g. Goodwill).

Feedstock

- all forms of building materials (e.g. plywood, floor coverings, etc.), fixtures and hardware, window units, cabinets, electrical and plumbing supplies, etc.

End Products

- cabinets
- doors
- electrical supplies
- floor coverings
- hardware
- plumbing fixtures
- windows
- drywall
- lumber
- plywood
- etc.

Examples

- **ReUze**, Scarborough, Ontario. A former renovator opened ReUze in April 1992 in a large warehouse (15,000 square feet) with financial start-up support from the MOEE (through the Industrial Waste Diversion Program). The business receives about 100 tons of material/month, including cabinets, doors, electrical supplies, floor coverings, hardware, plumbing fixtures, windows, drywall, lumber, plywood, etc. The average selling price of materials is about 75% less than if purchased new. Most of the store's clientele are homeowners and professional builders. The success of the centre is due in part to the local landfill bans on brick, concrete, drywall, metal, paper and wood.
- In Baltimore, Maryland, surplus residential construction material from contractors, manufacturers and others is donated to a non-profit agency, **The Loading Dock**, rather than landfilled. The donor receives a tax deduction rather than an invoice from a disposal company. The non-profit organization receives stock for its warehouse, which in turn supplies community groups with quality affordable building materials. Between 200-250 companies contribute materials on a regular basis, including ceramic tiles, windows, lumber, moulding, paint, plumbing fixtures, sinks and kitchen cabinets. In 1991 the agency diverted over 7,000 tons of usable supplies with a retail value of around $1 million (U.S.). A handling charge is assigned to every item, but nothing is "sold". The Loading Docks's current yearly budget is $346,000. The original staff of 3 has grown to 11 full-time employees plus over 3,000 volunteer hours/year.

Construction and Demolition Materials - Mixed C&D Waste Processing

Description

- Mixed C&D waste can be sorted into material streams which can then be sent on for further processing. Occasionally, further processing is done on-site (e.g. Canadian Eagle separates wood wastes from other wastes in mixed loads, but then also provides additional wood waste processing on-site).
- Mixed C&D waste processing is less common than source separation due to higher costs and additional difficulties in generating high-quality, clean products and materials.
- Prices paid for the end products of mixed C&D processing operations tend to average in the range of $5-$30 (U.S.)/ton.
- Based on experience in the U.S., $10-$25 (U.S.)/ton is needed to process source separated clean streams of rubble or wood. This compares with about $50 (U.S.)/ton to process mixed loads of wood and rubble.
- Because of the weight and bulk of many C&D materials, the cost to transport the material to the disposal site can be more important than the actual landfill tip fee.

Feedstock

- mixed (i.e. non source separated) C&D wastes

End Products

- various C&D materials, depending on incoming feedstock (e.g. metals, drywall, asphalt, bricks, concrete, wood, OCC, paper, carpeting)

Examples

- Eight facilities in Southern Ontario currently accept mixed C&D wastes for processing: Harkow Aggregates & Recycling, Canadian Eagle Recyclers/Greenspoon Demolition, Queensway Recycling, Teperman, Conwaste Inc., Delsan Demolition, Philips Environmental and Laidlaw Waste Systems. Each operation uses manual labour and light equipment (Bobcat with grapple) to separate recyclables from the mixed loads. Recyclables are then sent to other markets for further processing. The above companies also accept clean loads of source separated C&D materials.
- **Star Recycling** in Brooklyn, New York, uses a Swiss technology and significant amounts of labour to handle mixed wastes. The company has more than 1,000 0.75 cubic yard dumpsters for demolition sites that are serviced by special packer trucks with reinforced floors and sides. The processing system costs $1 million, and has a throughput of 200 cubic yards/hour of wood, rubble, dirt, paper, plastics and metal. Incoming material is dumped on the ground and grapple operators remove oversize items bigger than a desk. Smaller material is loaded onto a steel belted conveyor that takes it to a trommel. Different screens separate out 2" and 6" dirt and rock into separate hoppers. Further screening removes plastics, paper and wood. Material going through the drum enters an enclosed room where 14 pickers remove paper, plastic, wood, metal and garbage. Rocks and dirt go off the conveyor. A total of 25 staff oversee the system, including 2 full time mechanics. The wood chips are marketed for fuel, aggregates as paving material, and fines as landfill cover. The company estimates that the system recovers 85% of the incoming material.

Construction and Demolition Materials - Processing Source Separated Concrete and Brick for Aggregate

Description

- Concrete and brick can be processed to a variety of specifications for use as an aggregate substitute.
- Concrete/brick can be processed on-site with mobile crushing units or at a processing facility.
- At a processing facility, concrete/brick is passed through an impact crusher. Once crushed the material is referred to as aggregate. The aggregate is conveyed to a large electromagnet which removes ferrous metal (e.g. rebar reinforcements). The ferrous may be sold to scrap dealers. The aggregate then passes a series of screens that size material into 3 grades:
  - 3" is Grade A used in foundations;
  - 1.5" is Grade B used for sidewalks and other applications exposed to weather;
  - 3/8" is Grade C and is subbase material (e.g. footings for foundations).
- End use markets include government transportation departments, municipalities and concrete contractors.

Feedstock

- relatively clean concrete and brick (imbedded metal is acceptable)

End Products

- three grades of aggregate (3", 1.5", and 3/8") that can be used in road bed, foundations, sidewalks, subbase material, asphalt paving

Examples

- **Stapleton Resource Recycling Inc.** in Milford, Connecticut began operation in 1988 and now processes 300,000 tons/year of waste concrete, asphalt, masonry block and brick. Although the plant is capable of processing mixed loads of rubble, the company prefers to process concrete separately from asphalt, and then to mix the materials together in differing proportions, depending on the end use. The equipment includes a crusher, belts and conveyors, a screening plant, a magnet, a feed hopper and a portable power unit. The capital cost of developing the plant was about $1 million. Fourteen employees operate the facility. They produce four grades of material, all approved by the Connecticut Department of Transportation. The company is in the process of opening another plant which will recycle bulky waste (such as wood) by fall 1993.
- One Toronto area demolition contractor is operating a mobile crusher which goes to demolition sites and processes material on-site for backfill or grading applications. The unit is confined to selected sites due to restrictions on space available for storing material, time required to process rubble, and cost and noise impact on the neighbouring community. A mobile crusher that was used at the demolition of the Goodyear factory site in Etobicoke in 1990 processed and used on-site over 100,000 cubic metres of material, representing over 10,000 dump truck loads of material.
- **Philips Environmental** in Hamilton sends source separated loads of concrete, brick and asphalt to Taro Aggregates, an affiliate. Taro processes an estimated 300,000 tonnes of aggregate material/year, including foundry sands.

Construction and Demolition Materials - Processing of Source Separated Asphalt

Description

- Asphalt is a tar-based material used in paving materials, roofing shingles, protective sealants for foundations, and some types of floor tiles.
- Although paving material technically contains 95% aggregate and only 5% pure asphalt, it is commonly referred to as asphalt.
- Waste asphalt is generated when existing paved areas are prepared for repaving. This involves removing the top layer of the old asphalt before replacing it with new material. When roads are built and paved, gravel is put down and then covered with roadbase or roadbed material. This is referred to as cold mix and typically includes a mixture of crushed recycled asphalt, aggregate and stone. This layer is then covered with the hot mix (which may contain recycled asphalt) which serves as a protective coating for the road and is the layer exposed to traffic and weather.
- Asphalt can be crushed on-site during major road repair jobs and used as roadbase. Alternatively, asphalt can be processed at a stationary processing facility (ideally, located close to sites that generate large amounts of this waste). It is technically possible to accept and process only recyclable asphalt paving (RAP), but most facilities also accept used concrete, brick or tile which provides a good source of aggregate to mix with RAP to make recycled asphalt.
- Virgin asphalt is considered stronger and more durable than recycled asphalt — asphalt used in hot mix becomes brittle over time from weather, wear, and exposure to UV.

Feedstock

- the top layer of old asphalt
- asphalt roofing shingles (may be reclaimed for paving driveways, although it is not recommended for use on roads because it will not withstand extensive wear)

End Products

- 3" is used as paving or roadbase material
- 1.5" is used as roadbase or for patching potholes
- 3/8" is used in patching potholes

Examples

- **The City of Brampton** used a paving asphalt comprised of granulated roofing shingle manufacturing wastes on a test strip on Williams Parkway. The material is added to hot mix asphalt and was laid in September 1992. The material is produced by **IKO Industries** and is comprised of waste shingles which are shredded. (Note also that in the production of their shingles, IKO uses over 50% recycled paper and residue from the lumber processing industry in the raw felt for the shingles, and slag, a blast furnace by product, to make 100% of the sparkle black granules.)
- **ReClaim Inc.** of Tampa, Florida, recycles asphalt roofing debris into road patching and paving products. ReClaim is currently processing approximately 300 tons/day of asphalt roofing material at each of its two facilities, representing a service area of 1,400 roofers. Material must be clean and source separated at the point of generation. A full scale facility could recover 500 TPD, servicing a population of 500,000 to 3 million people (although smaller facilities could be profitable while processing 100-200 TPD). Each facility would employ 15-20 non-skilled labourers, 3 technical and 2 administrative workers. ReClaim facilities charge a tip fee that is approximately 2/3 less than local landfill tip fees to cover operating and marketing costs.

Construction and Demolition Materials - Processing Source Separated Drywall Into Gypsum

Description

- Waste drywall is processed back into gypsum which can then be sold for a variety of end use applications such as the manufacture of new drywall, or for use as a soil amendment, oil spill absorbant and cat litter.
- The processing operation involves material with an average size of 2' x 2' first being dumped on a tip floor and hand sorted for metal, plastic, etc. It is then loaded into a large grinder which crushes the material and feeds it onto a conveyor. An electromagnet at the bottom removes loose screws, nails etc. The material is then elevated to an enclosed processing area where it is further pulverized and sifted through a series of screens which separate the outer paper from the gypsum core. A second electromagnet cleans any remaining bits of metal from the finely powdered gypsum.

Feedstock

- primarily clean scrap drywall (although some facilities will accept demolition drywall also)

End Products

- gypsum for use in new drywall, cat litter, soil amendment, etc.

Examples

- **New West Gypsum**, Vancouver, British Columbia, is currently processing 175 tons of waste gypsum/day. A company representative predicts that with improved technologies, manufacturers will be able to achieve a minimum of 20% recycled content, and ultimately it will be possible to make wallboard composed of 100% recycled gypsum. New West has contracts with Domtar and Westroc (in British Columbia) to recycle all of their manufacturing wastes. New West also accepts scrap drywall from new construction. New West currently derives 99% of its revenue from tip fees. Recovered gypsum is sold back to wallboard manufacturers for a nominal fee of $1/ton (compared to the $12 to $14/ton normally paid for virgin ore). New West Gypsum also has recycling facilities in Oakville, Ontario, and Tacoma Washington.
- **Gyp-Pack Container Inc.** in Tonawanda, New York is a small business that manufactures a specialized truck used to collect and recover clean wall board scrap. The company is preparing to launch full scale production of the trucks. Gyp-Pack has secured patents for its proprietary wallboard recycling technology which is built into the trucks. The company has orders for 9 trucks, and anticipates selling 12 more in 1993. The technology enables nearly 100% recovery of scrap wallboard. One truck can recover an average of 10 TPD of gypsum. The trucks are designed to easily access nearly all types of construction sites. A crew of 3 go to a construction site where wallboard has been stacked and kept clean. The wallboard is fed into a grinder which separates the gypsum from the paper liner. The gypsum is then compacted into 1.5 ton cubes and sold to gypsum product manufacturers. The scrap paper liner is bagged and sold to local end markets. The company plans to license recycling operations throughout the country, and set up a Gypsum Recycling Exchange to connect truck operators with local buyers of recycled gypsum.
- **Recycling Earth Products Inc.**, Vista, California. This company collects scrap drywall from new construction sites, separates it into gypsum and paper, and converts it into 90-96% pure gypsum powder and hydroseeding mulch using their own equipment. Powdered gypsum is sold in bulk or bags; 1/16th to 1/8th " pellets are sold in bags. Bagged gypsum is sold to agricultural sources and landscaping businesses as a soil amendment. Facilities with calcination capabilities can use the recycled gypsum in the manufacture of new drywall boards. Paper backing from the drywall is recycled into a hydroseeding product. A pelletized granular form of calcium fertilizer (for golf courses) is also a product sold by Recycling Earth Products Inc. One plant is in operation; more are planned. An integrated plant will produce up to 3,000 tons of product mix/month, and employ about 30 people. Capital costs for a plant with collection, conversion, pelletizing, shredding, pulping and bagging capabilities would be about $2 million. Any area with 10,000 home construction permits/year would be an appropriate target for this type of facility.

RESH TRACKS
FOR OLD TIRES

RECYCLED RUBBER REQUIRED

The Intermodal Surface Transportation Efficiency Act, enacted in December, 1991, requires states to pave roads with asphalt that contains recycled scrap tire

WASTE RUBBER TO REEFS

The New Jersey Division of Fish, Game and Wildlife has been creating artificial reefs in the Atlantic Ocean for the past eight

Rubberized asphalt:
the New York State experience

As many as two billion scrap tires are currently stockpiled across the country, with an estimated 240
generated each
outlets has led

Scra
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Tires

Springfield, Illino
PUTTING TIRES

With 12 million
every year, Illinoi
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July, 1994 To r

Kmart Collects Customers' Tires
To Make New Rubber Products

Mat Maker Uses Old Tires
In its New East Coast Facility

RECYCLING TIMES 9

Everyday products from
recycled tire rubber

Scrap tires are finding their way into more and more useful products, conserving energy, reducing pressure on landfills and saving dollars along the way. From mats to mulch to rubber fenders, the applications for recycling tires and tire-derived materials are increasingly varied, practical and marketable. Although most of the product applications are not new, consumer interest and market recognition are helping create a new demand for products made from the recycled scrap tires.

USING SCRAP
TIRE RUBBER
IN ASPHALT

Cost, application methods, emissions and recyclability must all be addressed.

RECYCLED RUBBER FLOORING

HERE'S A
BETTER
WAY
TO USE
LD TIRES.

RECYCLED TIRES
DOWN THE ROAD

FRESH TRACKS
FOR OLD TIRES

Everyday products from
recycled tire rubber

Tires - Overview

Definition

- passenger and truck tires and industrial tires (steel-belted and non-belted)

Current Market

- The current destinations for used tires are recycling, export and landfill.
- Approximately 45 Ontario municipalities have banned tires from landfill disposal, creating a major demand for disposal alternatives.

Issues/Trends

- Tires cause problems in landfills. They resist compaction, and methane gas collects in the cavities, causing tires to float to the surface.
- Stockpiles represent an environmental and health and safety problem. (Whole tires are fire hazards and breeding grounds for insects and vermin, for example). The number of tires stockpiled in Ontario is decreasing.
- Markets for the materials derived from scrap tires are underdeveloped.
- 90% of all tires are steel-belted and therefore more costly to process.
- Regulation 347 prohibits burial of whole or shredded tires without a Certificate of Approval.

Reuse/Recycling Processes

There are seven potential markets for used tires:

Tire Reuse/Retreading

- Used tires that are not badly worn may be sorted and reused.
- Worn tires may be retreaded.
- Reuse is a common, established practice. Retreading is common for truck tires (uncommon for passenger tires).

Whole, Sliced and Stamped Tire Applications

- Tires may be used whole for applications such as docks, sliced for bush roads or blasting mats, or stamped for products such as shoe soles.

Tire Shredding and Chipping

- Tires may be shredded or chipped for use as aggregate (e.g. soil amendment), or as fuel (e.g. boiler fuel), although incineration of tires is not permitted in Ontario.

Crumb Rubber

- Crumb rubber (a very fine rubber powder) is produced by grinding, granulating or freezing tires. Crumb rubber is used in the production of many different rubber products.

Devulcanization

- Devulcanization is a process that restores the rubber from used tires back to nearly virgin state. It is still at the demonstration stage and will not be dealt with in further detail in this manual.

Pyrolysis

- Pyrolysis involves anaerobic superheating of tires to break them down into their constituent parts. This is an expensive, large scale undertaking and will not be dealt with in further detail in this manual.

Tires - Reuse/Retreading

Description

- Used tires that are not heavily worn are sorted and sold on the used tire market.
- Used tires may be fitted with a new layer of tread. This involves buffing the used tire to remove existing tread, cleaning the tire and applying new tread. A waste rubber dust is produced which can be marketed to producers of moulded rubber products. Retreading is largely limited to the trucking industry (bias ply truck tires in particular are built to be re-capped many times).
- 10-30% of used passenger tires are sorted and resold with no retreading. These usually sell for about 1/4 the price of new tires. This is a fairly well-established enterprise already resulting in a 5-10% reduction in the number of tires entering landfills.
- Very few conventional passenger tires are retreaded in Ontario, due to economic considerations and negative consumer perceptions regarding retreads. Retreading is quite common in the trucking industry, however, where a new tire can cost up to $250 vs. $70 for a retread.
- Retreading is a known process involving relatively simple and widely available equipment.
- Small truck tire retreading operations are common. Capital investments can range from $100,000 to $300,000 for a 10-30 tire/day operation.
- In most areas, existing tire retreaders are operating at less than full capacity.
- Retreaders should be aware of requirements under the Federal Motor Vehicle Tire Safety Act.

Feedstock

- used tires (primarily truck tires)

End Products

- retreaded tires

Example

- **Achievor Tire**, L.P., in Chicago, Illinois, is one of the largest passenger tire recycling operations in the U.S. with an annual production capacity of around 500,000 units. The company's product line consists of over 200 sizes and styles of passenger tires. Tires are buffed to remove all surface rubber, tread and sidewall. Uncured rubber is co-extruded to produce a tread and base material which is then applied to the tire. Sidewalls are applied and the tires are then cured. The remanufactured tire is about 30% cheaper than a new tire. Capital investment for a plant producing 250,000 tire units is around $10 million.

Tires - Whole, Sliced and Stamped Tire Applications

Description

- Tires may be used whole for applications such as docks, or sliced for bush roads or blasting mats. The operations involved are generally low-tech, with low capital requirements.
- Tire slicing/stamping (e.g. used in the production of shoe soles) is generally suitable for small scale production. The equipment required to cut tires into pieces is relatively inexpensive, about $12,000.

Feedstock

- used tires (non-belted tires are best suited for many of these applications)

End Products

- whole tire uses include ship dock bumpers, docks, erosion control, playground swings
- sliced tire uses include temporary access roads, blasting mats, door mats, horse fencing, water troughs for animals (fashioned from large truck tires)
- stamped tire uses include bumpers for truck docks, soles of shoes

Examples

- **F&B Enterprises** in New Bedford, Massachusetts, operates one of the largest fabricating plants for recycled tire products used on fishing boats and docks worldwide. The company manufactures rubber rollers, rock hoppers, fenders and bumpers by cutting, punching, chopping or slicing scrap tires (from passenger car tires to mammoth earthmover tires). The company's newest product is a rubber fendering system designed to wrap around wooden dock pilings to protect both the pilings and boats that tie up to the docks. The rubber fenders will help extend the life of the pilings and reduce the need for repair and maintenance, saving thousands of dollars for dock and commercial fishing craft owners. They are also testing rubber disc fenders in several New Bedford area locations (the City's Harbor Development Commission recently installed a set). In addition, F&B makes a shoe sole from scrap truck tire sidewalls and a steel back fendering system made from scrap forklift tires. They also sell several hundred thousand pounds of playground cover materials made from recycled rubber chips. Last year, F&B recycled more than 18 million pounds of rubber and expects to double that figure in 1993.
- **The Terramat Corporation** in Ohio cuts the sidewall out of tires and laces sliced tires together to make temporary access roads/bush roads for heavy truck traffic. The roads are used in Alaska, Siberia, and in British Columbia and New Brunswick for forestry. They have also been used while making golf course improvements to avoid damaging the fairways. Production of 500 feet of road/week consumes approximately 5-6 trailer loads (each trailer load is about 280 tires with a minimum diameter of 20"). The equipment used to make the temporary roads costs less than $50,000 (not including materials handling equipment such as a forklift). The CM 420 model sells for $270 U.S. and is 20' x 11'. Terramat is willing to license the technology for $40,000 plus royalties.
- **Topper Floating Docks** of Toronto is the Ontario distributor of T-Float docks. The floating device is made of old tires with polystryrene foam injected into the cavities. This portion of the dock is imported from British Columbia. Each tire can support 150 lbs. The dock is then finished with lumber decking. The top of the dock could be constructed with recycled lumber to produce an entirely recycled dock. It may be possible to construct the entire dock in Ontario.

Tires - Whole, Sliced and Stamped Tire Applications cont'd.

Examples

- **Richard Weirmeir** in Bentinck, Ontario, has devised a process whereby old tires are recycled into doormats. One tire makes an average sized mat. The first step is to cut a tire into strips about an inch wide. These are then taken to a machine where holes are punched into them. Then the strips are woven onto a framework of galvanized wires. The process takes about a half hour. Weirmeir has been making mats for four years. Prior to that he owned and operated a small engine repair business; his experience with engines helped him to create the machines he uses to cut up tires and punch holes in the rubber strips. The mats come in four sizes, with an average retail price of $15. Weirmeir sold over 300 mats last summer, in places as diverse as Owen Sound, Hepworth, Waterloo, Arizona and Florida.
- **Moore Roof Systems**, Squamish, British Columbia, uses old tires as roofing shingles, in garage-type applications. The tires are cut into pieces and laid as shingles on rooftops. The company has received several grants to assist in their efforts, and have installations in Squamish and Edmonton.
- **L.O.B. Blasting Mats** in Sturgeon Falls, Ontario, operates a facility where tires are sliced, hole punched and laced together to make blasting mats for use in road construction. They produce around 500 mats a year from 150,000 tires.
- **Enviromat**, Hawksbury, Ontario, makes door mats, fatigue mats and safety mats from tires for use in either the home, factory, retail or agricultural establishments. The company also makes bungy cord out of sidewalls for wrapping skids, tarps.

Tires - Shredding and Chipping

Description

- Shredding is the first stage of preparing a whole used tire for grinding, cryolizing or granulating.
- Tire chips/shreds can range in size from 1/2" to 4".
- Shredded or chipped tires are also used as aggregate (e.g. direct use of tire chips as a bulking agent or as a playground surface).
- The minimum capital cost to shred tires is about $150,000.

Feedstock

- used tires

End Products

- playground surfaces
- soil amendment
- embankment fill

Examples

- A demonstration project using chipped tires as a soil amendment at **Ann Tindal Park** in Toronto's Harbourfront area has recently been completed. The park has very high pedestrian traffic, and maintenance costs for the lawn were escalating rapidly. This innovative project used 25% recycled rubber chips (2-3mm) mixed with 75% sand and soil under the grass. The addition of the tire chips is to make the lawn more resilient, better aerated and to filter rainwater more effectively. The newly renovated lawn has been open to the public since June 1993 . The project used over 25,000 tires.
- **International Soil Systems** of Fort Collins, Colorado buys shredded rubber for use as a soil amendment. ISS sells the soil amendment product and the technology for use in turf management and soil improvement. Locations where the product has been used include athletic fields and golf courses in Florida, in mine reclamation on tailings, and in mine settling basins in Arizona.

Tires - Crumb Rubber Production and Use

Description

- Whole tires can be made into crumb rubber, which can then be used to make new tire-derived products.
- Crumb rubber is a fine material (4 or 10 mesh or finer).
- The processes for making crumb rubber are:
  - grinding: rotary crushing drums are used to grind tires into a powdery substance. This is the cheapest, most reliable and most common process.
  - granulating: preshredded tires are passed through a series of granulators where a chamber containing a rotating shaft with blades cuts the shreds into finer pieces (estimated equipment cost of $1.2 million).
  - cryogenics: shredded tires are frozen with liquid nitrogen, then smashed with a hammermill and screened. Fibre is removed and steel is magnetically separated. This is more energy intensive and expensive than other processes, but produces a finer, more valuable crumb.

Feedstock

- whole or shredded tires

End Products

- **athletic fields:** ground rubber can be used in the supporting structure of playing fields or mixed with material that comprises running track surfaces. It is also used to make floor mats used in gymnasiums and outdoor practice areas. This market is expected to increase by 1-3% over next 5 years in the U.S.
- **friction material:** many brake manufacturers use small amounts of crumb rubber in compounding of friction materials. There is insignificant growth potential for this application.
- **bound rubber products:** ground rubber is formed into a set shape, typically held together by an adhesive material or combined with another polymer to make railroad crossing ties, dock bumpers, patio floor blocks, flooring material, roof walkway pads and carpet underlay. Growth potential is estimated at 4-6% over the next 2 years in the U.S.
- **moulded rubber products:** finely ground rubber can be used to form rubber products for the automotive industry, sound insulation etc. The process involves mixing crumb rubber with small amounts of sulphur, compressing the mixture into moulds and baking the mould in a kiln. The basic equipment for the process costs approximately $250,000 (U.S.) The growth potential is 1-3% in the U.S.
- **extruded rubber products:** these are made by putting crumb rubber through a turning screw. As the material flows through the screw, it melts and is injected through a die to create the desired form. Products include irrigation hose, washers and gaskets.
- **crack sealants and waterproofing:** crumb rubber can be used in the production of crack sealant for roadways and waterproofing products.
- **rubber modified asphalt:** since 1990 Ontario has undertaken 22 demonstration projects using rubberized asphalt. Preliminary findings from the first 11 demonstration projects indicate that there is no reason why the quality and performance of properly designed and placed generic dry process rubber modified asphalt cannot be equivalent to conventional hot-mix asphalt.

Tires - Crumb Rubber Production and Use cont'd.

Examples

- **Recovery Technologies** in Cambridge, Ontario, use cryogenics to process tires. The facility has a capacity of one million tires/year. The company also sells turkey recycling plants. In addition, Recovery Technologies operates a recycling facility, processes scrap tire and sells recovered crumb rubber, etc.

- **National Rubber Company Inc.** in Toronto, Ontario, is the largest independent manufacturer of recycled rubber products in North America. National Rubber has sales of approximately $50 million/year and employs about 500 people. The majority of production is exported to the United States, where the automotive industry is an important market. National opened its own grinding facility in 1994. By 1996 it will be processing 1/3 of Ontario's scrap tires.

- **Sportsbau Canada** in Mississauga, Ontario, is a ten-year-old company specializing in the installation of rubberized urethane surfaces. A competitive all-weather track can use 100 tonnes of crumb rubber. Playground surfaces 30-50 mm thick require about 2.7 kgs of rubber/square metre, at a typical cost of $107/square metre. Sportsbau purchases rubber from Ontario and U.S. sources.

- **Carlisle Tire and Rubber** in Pennsylvania makes a resilient safety surface — Playguard — using reclaimed tire rubber with a tough polyurethane binding material. Playguard meets U.S. consumer product safety commission guidelines for shock attenuation from falls up to 10 feet depending on tile thickness selected. It can be installed over finished hard bases such as asphalt or concrete, or loose compacted bases such as gravel, sand or earth. Carlisle's Softpave product line received a *Popular Science* magazine 1989 award for one of the 100 best new products. It can be used outdoors on patios and walkways and indoors to provide a heavy duty high-traction surface for exercise and locker rooms.

- **Infratech Polymers** in Langley, British Columbia, currently makes three products from old tires, and has another on the drawing board. The company was formed by two partners, one of which worked for the Ministry of Transportation and Highways for 13 years, and was also Superintendent of Streets and Paving for North Vancouver. Their plant cost $1.2 million, and running at 66% capacity uses 512 tonnes of tires/day (at an average of 20 lbs./tire). It employs 9 people — a foreman, plant operator, electrician, welder, loader, tanker drivers, and office staff. Infratech uses crumb rubber to make an asphalt rubber binder which combines with aggregate to pave roads. It sells for $3.40/tonne, increasing the cost of asphalt per ton by 67%. However, the product is more UV stable than the products it replaces, does not crack, is less susceptible to damage, and has a 2:1 structural equivalency (so for applications greater than 1.5", half of the regular amount can be used). The product is being used in several applications, including a stretch of the Whistler Highway, and in the North Vancouver District on residential streets. Infratech also makes a crack sealant (Bi-Crackee) from 50% waste products (recycled tires and a waste product from the pulp and paper industry). The company's paving membrane also uses recycled tires, and has been used in Oregon and the State of Washington.

Organics

N ORGANIC RECIPE FOR SUCCESS

A STRAWBERRY patch started Greendell Farms, Inc.'s composting business. In the late 1960's, Byron and E
Green

EXPANDING USES FOR POULTRY LITTER

FOOD WASTE AS LIVESTOCK FEED

COMPOSTING ON THE LAKE

Rather than waiting for a solution, a nursery operator on the North Coast takes matters into her own hands.

CLAIMING MINELANDS WITH ORGANICS

Project Shows Municipal Wa Composting Use In Sod Pro

Calverton, N.Y. — A three-year field demonstration of the use of municipal solid waste compost in sod production will be conducted in Calverton, N.Y

NEW BUSINESS POTENTIAL

TURNING FISHERY WASTES INTO SALEABLE COMPOST

COMMERCIAL fish processing yields more than three million pounds of waste annually in Wisconsin alone, and

FOOD RESIDUES BECOME COMMUNITY ASSET

Private company composts food processing residuals. The product makes money and creates jobs for Kenosha, Wisconsin

MARKETING ORGANIC SOIL PRODUCTS

FOR THE LAST 20 years, the bark mulch industry has successfully recycled wood products into useful consumer and commercial goods for the horticultural industry. Like municipal composting projects today, the bark mulch industry was of environmental regulations.

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Organics - Overview

Definition

- Organic material includes:
  - leaves, yard waste, brush and grass clippings;
  - food wastes and other organic wastes from residences and commercial operations (e.g. food processing companies, produce terminals, grocery stores, restaurants, cafeterias);
  - agricultural crop residues and animal wastes (e.g. dairy and poultry waste, fish waste, etc.);
  - wood (e.g. construction and demolition debris, stumps, trees);
  - sawmill wastes;
  - sewage sludge;
  - sludges from paper mills.

Current Market

- Generally, markets for organic products are local due to high transportation costs.
- The prices paid for organic materials vary according to the specific application and end market. For example, distributing food for reuse may generate no revenue, while a specialized, high quality compost product may sell from $20-$100/tonne.

Issues/Trends

- Reducing the organic fraction of the waste stream is becoming a widespread practice in southern Ontario for the following reasons:
  - organics represent a significant portion of the waste stream which can be easily source separated;
  - high landfill disposal fees are making organic waste reduction and source separation increasingly viable for municipal and IC&I waste generators;
  - the province's new regulations require the collection and composting of leaf and yard waste in communities over 50,000 people.
- The quality of the end product is of the utmost importance. Any contamination or adverse health effect (real or perceived) would seriously impact product demand.
- Some difficulties in siting a composting facility because of public opposition.

Reuse and Composting Processes

Redistribution of Surplus Food

- Surplus food in good condition and from known, reliable sources (e.g. restaurants, grocery stores) can be redistributed through networks such as food banks, and social service organizations.

Centralized Composting

- Centralized composting involves collecting organic wastes from residential and IC&I sources, and processing the material at a central site using a controlled composting process.

Reuse/Reprocessing for Animal Feed

- Waste food that is not fit for human consumption, but is suitable for animals, may be sold as animal feed. This form of reuse is regulated by Agriculture Canada and is subject to strict quality control standards.

Organics - Redistribution of Surplus Food

Description

- Surplus food in good condition and from known, reliable sources can be redistributed to people in need through networks such as food banks, and social service organizations. An individual or organization can act as a broker between sources of supply and users in the social service sector.
- Prepared food must be handled by individuals who are trained in food handling (e.g. drivers collecting food, service agency accepting food, etc.)
- At present, the demand for food from social service agencies far exceeds the amounts that are collected by food redistribution organizations.

Feedstock

- Surplus food destined for human consumption must be of high quality. Common sources include:
  - conventions, corporate and private parties and other catered events;
  - post-expiry, but good quality supplies from retailers and manufacturers;
  - grocery stores, restaurants, hotels, hospitals, bakeries, dairies, butchers, etc.

End Products

- surplus food, including packaged products, prepared meals and fresh produce.

Examples

- Second Harvest in Toronto, Ontario, is a non-profit organization that acts as a broker between sources of surplus food, and social service organizations attempting to deliver food to people in need. The grassroots organization employs eight people and has an annual operating budget of $430,000 (funded primarily by corporations and foundations). Staff and volunteers locate, collect and deliver perishable food to various social service agencies in the Greater Toronto Area. Major food donations come from small "green grocers", farmer's markets, and Scott's Chicken Villa. The organization is currently working with Transport Canada and health authorities to collect surplus milk and other packaged food from Air Canada and Cara Foods. Similar non-profit organizations operate in Calgary and Vancouver.

Organics - Reuse/Reprocessing for Animal Feed

Description

- Waste food that is not fit for human consumption, but is suitable for animals, may be sold as animal feed. In some cases, food waste is reprocessed and mixed with other ingredients to produce new forms of animal feed. The reuse of food as animal feed is regulated by Agriculture Canada and is subject to strict quality control standards.
- The use of food waste as animal feed is feasible if the waste product is price-competitive with regular feed ingredients, and offers comparable quality (nutrient value).

Feedstock

- Feedstocks may include different types of food waste that are generated as a by-product of food processing operations, or during food preparation and post-consumption from hotels, restaurants, institutions, etc. Examples include:
  - dry manufacturing food wastes and by-products such as oil, meals, bakery waste, and cereals, which contain large quantities of nutrients;
  - wet manufacturing food wastes and by-products such as dairy, brewers grains, which have high fibre content;
  - food processing wastes and by-products such as waste from potato chip manufacturing and vegetable canning, which may contain high levels of fibre;
  - food produce waste from large supermarkets/green grocers.

End Products

- animal feed for cattle, sheep, goats, pigs, poultry, etc.
- pet food (dog food, cat food, etc.)

Examples

- Roger Wittenberg started a unique manufacturing business called **Coastal Milling** in 1987. Located in Philadelphia, Coastal Milling is a poultry feed supplement company producing 10 million pounds of feed per month from discarded packaged foods. The food comes from grocery stores and manufacturing plants, which reject food items because of small defects (off-spec material, improper packaging, etc.). The feed supplement is sold to poultry growers, and generates annual revenues of about $15 million (U.S.).
- **McDonald's** is working with the Gas Research Institute to develop a food processor that will grind and dehydrate McDonald's food waste for use as animal feed.
- **Hy Hopes Farms** in Ajax, Ontario, runs a swill feeding operation licensed by the federal government. For a fee, the owner of the hog farm collects about 135 tons of organic material from 25 IC&I locations (predominantly hospitals, restaurants, etc.) each week. Steel drums and wheeled carts are used for collection — the farmer picks up full containers and leaves clean, empty containers behind. Organic material is boiled and prepared according to ministry guidelines and fed to the pigs.

Organics - Centralized Composting

Description

- Composting is a controlled, aerobic process of biological decomposition that converts organic waste (e.g. yard waste, brush, food waste, crop residues, etc.) into a stable soil amendment.
- At present, most centralized composting in Ontario is managed by/for municipalities as part of a waste management program.
- As a private sector enterprise, centralized composting typically involves the management and operation of a composting site (which may be either privately or publicly owned). Organic materials are received at the site (possibly in exchange for a "tip fee") and processed into a marketable soil supplement for sale to nurseries, landscape or building contractors, private gardeners, municipalities and other buyers.
- Opportunities exist for both small- and large-scale composting facilities. Composting sites are currently operating at production rates of less than 10 TPD, to several hundred TPD. The technology required is not necessarily capital intensive. Markets must be local (generally within a 50 kilometre radius) because of high shipping costs.
- Markets for compost are in their infancy. One U.S. study estimates that the potential annual demand for compost currently exceeds supply by a factor of ten (*Biocyle*, January 1993).
- Compost must compete with other soil amendments, such as peat moss. Perceived poor quality and limited applicability is still a problem in some compost markets. Potential users must be convinced that compost is a safe and viable substitute for other soil amendments in terms of price, quality, and performance.
- Different end marekts have different specifications for compost quality (e.g. agriculture, horticulture, turf management, etc.). To be marketted successfully, compost quality must satisfy end market requirements.
- Centralized composting is subject to regulations and guidelines at the provincial level (e.g. Environmental Protection Act, Ontario Water Resources Act, Ontario's Interim Compost Guidelines). The sale of soil supplements including compost is federally controlled through the Canada's Fertilizer Act. In addition, centralized composting sites in Ontario must be permitted by the Ministry of Environment and Energy.

Feedstock

- Virtually any organic material can be composted. Currently in Ontario, the most common feedstocks are brush and yard wastes. Food wastes and specialized organic wastes from IC&I locations have been composted successfully, but not as commonly at this time.
- Feedstock requirements may vary according to compost product specifications and applicable government regulations.
- Ontario's Interim Composting Guidelines dictate that feedstock must be free from contamination.

Processes

- There are two basic types of centralized composting facilities:
    - Open windrow facilities are the most common. Once collected, the organic material is moistened and placed in windrows that are turned regularly for aeration. Compost must be cured for six months.
    - A number of more capital-intensive processing technologies are also available, ranging from "aerated static pile" systems where the compost is left standing and aerated with pipes or ducts, to sophisticated and more costly "in vessel" systems where the compost process is entirely enclosed.

Organics - Centralized Composting con'td.

End Products

- In general, there are two potential markets for compost:
  - One market will be for high quality compost for commercial sale to nurseries, landscape companies, home gardeners, and other specialized users. The ability to meet particular end market specifications is of primary importance.
  - A second market will be for large-scale agricultural and land reclamation applications that require lower quality standards, but will consume large volumes of compost. Prices will be lower in this market, but waste diversion potential is higher.

Landscapers

Compost is sold to landscapers for use as top dressing, mulch, and soil amendment for new plants and landscape areas. The landscape service industry is probably the largest purchaser of municipal compost in areas where it is available.

Agricultural Uses

Compost is used as a soil supplement for agricultural uses and erosion control. Compost can be used on vegetable and field crops, forage grasses, development of marginal lands and as a mulch. A high quality compost may be sold for specialized agricultural applications such as berry farming or mushroom production. According to the Berry Growers Association of Ontario, this industry represents significant market potential for compost, providing that the product is clean. Berry farmers in Southern Ontario are beginning to purchase large quantities of compost from municipal sites.

Residential/Retail

Compost is sold to homeowners and businesses as a packaged soil supplement/ fertilizer. High quality compost can be bagged and sold as a substitute for mushroom compost, peat moss, manures and topsoil. Compost can be sold through grocery stores, home improvement centres, gardening centres, nurseries, etc.

Silviculture

Compost can be provided as a soil suplement to silviculture operations which grow trees for harvest and reforestation projects. This includes Christmas tree farming, pulpwood and timber production. Some silviculture firms produce their own seedlings, and others are responsible for the planting and managment of forest lands. There is also potential to use compost as mulch in woodlot improvement projects.

Horticulture

Compost is sold to nurseries and greenhouse growers as a replacement for peat moss. There are nurseries operated by the Ministry of Natural Resources in Northern Ontario, as well as private, commercial growers. Some of these nurseries import soil amendment from as far away as the Maritimes for their containerized stock (tree seedlings, etc.). Using high quality compost in containerized tree stock (in tree nurseries) is currently the subject of intensive research in the northeastern and southern U.S. Nurseries (both public and private) represent potential markets for compost, provided that the product is demonstrated to be effective and clean.

Landfill Cover

Landfill cover provides an immediate use for compost while other markets are being developed. This use offers a potentially stable market for lower grade and nonuniform compost products.

Other End Markets

Other end markets include: sod production, bulk soil supplements to golf courses, municipal parks, and other private or public properties.

Organics - Centralized Composting cont'd.

Examples

- **Compost Management Associates** of Elora, Ontario, is a full-service company that manages and operates composting sites on a turn-key basis on behalf of municipalities in Ontario. Currently, the company manages sites in 15 Ontario communities, ranging from rural townships to major urban centres such as Mississauga and Scarborough. The company has focused on developing the technical expertise required to design composting sites, process a wide variety of feedstocks, and solve on-site problems such as odours. It provides consulting and "trouble-shooting" services to both public sector and private sector operators. Compost Management currently employs 18 people.

- Roland and Phil Lemieux of Sault Ste. Marie manage a small-scale composting operation on 20 acres of private land. Feedstocks are local materials including Christmas trees (collected by a local environmental group), yard waste (dropped off at the site by residents), manure (picked up from farmers), and waste Lotto tickets. The Lemieux family plans to start food waste collection at a nearby inn. All material is composted in open windrows and the site is permitted by MOEE. About $200,000 has been invested in a tractor, a Wild Cat turner, collection vehicles and other equipment. The compost is mixed with topsoil and sold locally to contractors, landscapers and city parks at $32 per cubic yard. It is also sold locally to home gardeners, and plans are in place to start bagging the material next year for sale to local garden centres. They sold out of their product quickly last year and predict growing demand.

- Dr. Sukku Mathur in Ottawa has designed a commercialized composter for fish waste called the "Passively Aerated Windrow System". The composter is being used in a few locations in Ontario and in Minnesota, where a company is using the system to compost fish waste with turkey manure.

- **Compost Connections** in Maine is developing a network of "composting farms". The company seeks out generators of organics and brokers materials to an affiliated farm in the network.

- **Grow-Rich** in Niagara Falls, Ontario, makes compost primarily from paper mill sludges. The plant takes incoming waste, shreds it, adds other organic ingredients and a patented catalyst, and composts the material in windrows. The company is producing about 200 tons of compost/day. The material is distributed in bulk and in bags to various markets. About 500,000 bags are sold each year. Grow-Rich has an exclusive arrangement with the largest garden center chain in Canada.

- **Gro Bark** in Claremont, Ontario, is composting bark from sawmills, mixing it with sand and peat moss and marketing the product as a soil mix for container-grown nursery stock.

The market is willing:
post-consumer textiles

DIVERSION TO DOLLARS

TAPPING TEXTILE RECYCLIN

BETWEEN FOUR and five per- cent of the solid waste stream is clothing that could be salvaged before it's thrown away," says Jerry Usatch, president of Du- mont Export Corporation. His 53-year-old family business buys, sorts and sells over 100 different kinds of clothing, rags, remnants and

ag recycling in Iowa

extiles have been part of the mu- cipal recycling program in Lee ounty, Iowa since 1988. Located in

Processing involves baling the material with a 60" downstroke baler and loading the 1,300 pound bales

FASHIONS COME FULL CIRCLE

Recycling Council Aims To Increase Recover

The Council for Textile Re- cycling Inc. was re- cently forme

GBB BROKERS 50,000 TO
OF RECYCLABLE TEXTILES

GBB, Falls Church, V executed an agreeme with a textile consortium made

TEXTILE WASTES ADD UP

Textiles discarded by Americ clothing, bedding, linens, and the — amount to around 35 pounds a per person in the United States.

Textiles

RAGS TO RICHES

Carroll County, Iowa
CURBSIDE TEXTILE RECYCLING

A commingled blue box program with weekly curbside collection currently serves 44 western Iowa communites in a four county area. According to recycling coordinator Sara

Textile Recycling

The Council for Textile Recycling, Inc. (Bethesda, Md.) has launched a program to prompt businesses and consumers to divert their old textiles from the waste stream and direct them to for recycling. The council

TRADING IN TEXTILES

Charities band together in Blue Box textile recycling scheme

Ottawa — A unique alliance of three charitable organizations, a waste collection firm and a municipality has spawned a textile recycling program that is expected to divert some 600

drop-off centres and through their pick-up service in the Ottawa area. Recent data from the Regional Municipality of Ottawa-Carleton's waste

and

of three

The market is willing:
post-consumer textile

Textiles - Overview

Definition

- Textile waste is broadly classified as either post-industrial or post-consumer.
- Post-industrial textiles include by-products from the apparel industry (e.g. scrap from textile mills, off-spec materials, etc.)
- Post-consumer textiles, including clothing, blankets, draperies, furniture upholstery, etc., can be reused or recycled. In some cases, post-consumer footwear is included within the same systems that process textiles.

Current Market

- There are currently three major markets for used textiles:
  - used clothing markets (domestic and overseas);
  - commercial fibre markets;
  - industrial wiping cloth markets.
- Prices paid for textiles vary depending on the particular market and end use. (For example, prices range from $0.05/lb. on cuttings to $0.45-0.50/lb. for bleached wiping cloth.)
- Domestic and export markets for used textiles appear strong at the present time. The North American used textile processing industry as a whole faces a shortage of supply currently and in the foreseeable future. Local market conditions will vary, however, and should be carefully assessed.

Issues/Trends

- Quality standards for post-consumer textiles are becoming more stringent. Textile recyclers are becoming highly selective regarding the textiles they will accept and pay for. The most marketable post-consumer textiles are:
  - cotton fabric by-products (100% cotton cuttings), especially items that are all white;
  - waste items of 100% wool;
  - remnants large enough to be used as industrial wiping cloths.
- Cuttings of mixed fabrics and colours (especially those that are contaminated) are in oversupply.
- Some industry representatives are concerned that curbside textile recovery programs may not be able to provide the level of quality that the textile markets require; however, a number of muncipalities are currently collecting textiles in blue box programs (e.g. Ottawa, Barrie, Mississauga).
- Non-profit organizations (e.g. Goodwill, Salvation Army) have an established collection network for textiles. Many are interested in developing joint projects with other organizations, associations, etc.
- The effect of curbside textile collections on charities that have established used clothing programs is a potential concern. Charities and other non-profit groups may feel threatened by this perceived competition.
- There is a trend towards increased cooperation between the present users of post-consumer textiles (i.e. non-profit groups and private textile processors).

Reuse/Recycling Processes

Processing of textiles for resale

- A variety of businesses and organizations process textiles for resale to a variety of end markets such as for used clothing and industrial wiping cloths.

Remanufacturing of textiles into new material

- Some textile grades can be used as a feedstock in the manufacture of new garments, or to make felt, cotton swabs and rag bond paper.

Textiles - Processing for Resale

Description

- Processing textiles for resale involves sorting post-industrial or post-consumer textiles for distribution to a variety of end markets. The major markets include used clothing (domestic and international), industrial wiping cloths, and used fibre, which is incorporated into a variety of products.
- The requirements for preparation and shipping of textiles vary with each end market. Markets may specify:
  - trimming (e.g. removing zippers, buttons, etc.);
  - baling, shipping in gaylords or in plastic film;
  - processing of textiles through a tearing maching to prepare them for markets that require fibre.
- Used textile operations range from local used clothing services (usually sponsored by charitable organizations) to large-scale, sophisticated sorting operations that sort textiles into more than 150 grades for shipment to established domestic and international markets.
- Textile processors can range in size from small cottage-scale businesses to industrial operations employing up to 100 people or more. The majority of processors are relatively small, typically employing 35-50 people. The required processes do not normally require large capital investments. The primary requirement is a large facility with adequate space for material handling and sorting, which is a relatively labour intensive process done on large sorting tables or, in some cases, conveyor belts.

Feedstock

- Post-industrial textile waste consists of by-products from the cotton, fibre, textile and apparel industries (e.g. off-cuts, off-spec materials and other scrap from textile mills, clothing manufacturers, furniture manufacturers and other similar sources).
- Post-consumer waste consists of any used garments or household articles made of manufactured textiles, including used clothing, bedsheets, blankets, furniture upholstery, drapes, etc.).
- In all cases, feedstock must be free of moisture, dirt, mildew and other forms of contamination.

End Products

- used clothing
- industrial wiping cloths
- used fibre — incorporated into a variety of products (e.g. upholstery padding)

Textiles - Processing for Resale cont'd.

Examples

- **Centre and South Hastings** collect textiles as part of the local blue box program. The textiles are then upgraded at a local training centre for the Severely Employment Disadvantaged (SED) Project. The materials are then marketed as industrial wipes (2%), reusable clothing (1%), shredded material for mattresses (13%) and clothing for export to developing countries (84%). The SED Project receives $200/ton for reusable clothing and industrial wipes (about $1/lb.), and about $150-$200/ton for shredded material.
- The City of Ottawa's **Recycling Together Program** involves three local charities (the Salvation Army, St. Vincent de Paul and Ottawa Neighbourhood Services) working together with the city and its private recycling contractor. Approximately 3-4 tons of material are processed each day. Some material is distributed by the participating charities while the remainder is shipped to used clothing markets overseas or to domestic users of wiping cloths and fibres. The operation employs about 30 people.
- **Trans-America Trading Co.** in Brooklyn, New York, is an example of a large intermediate textile processor. The company buys about 12 million lbs./year of mixed rags, new and used clothing, and piecegoods and remnants. This material is sorted and processed for use as used clothing (overseas 50%), fibre (25%) and wiping cloths (25%). The plant employs about 120 people (70 people in textile sorting, 35 in wiping manufacturing, 15 in fibre processing).
- **Dress For Less Clothiers** is an example of a successful retailer who specializes in the sale of men's used designer clothing. About 500 suits and a selection of sport coats, pants and sweaters are on display in the Denver, Colorado retail store. The cleaned and pressed stock is all previously worn clothing which comes from agents in New York, Chicago and Toronto, as well as through local contacts. Tailoring is available. Most of the clothing is sold on consignment, and the consignee gets 50% of the selling price if it's purchased within 30 days. The company grossed $250,000 in 1991.

Textiles - Remanufacture into New Material

Description

- Some kinds of textiles can be used as a feedstock in the manufacture of new material. One grade of textile (cotton rag stock) is used in the manufacture of rag bond paper. Some wool garments can be rewoven into new garments. Other textile grades are used to pad upholestry and automobile interiors. The felt layers in automobile interiors also contains recycled fibre. Common products such as cotton swabs, mops, gauze and matress pads often contain recycled fibres.

Feedstock

- Both post-industrial and post-consumer textiles can be used in the remanufacturing process.
- Cotton rag stock, wool garments and other specific pre-sorted textiles grades can be used in remanufacturing. The specific grade or textile that might be required varies depending on the end product and the remanufacturing process.

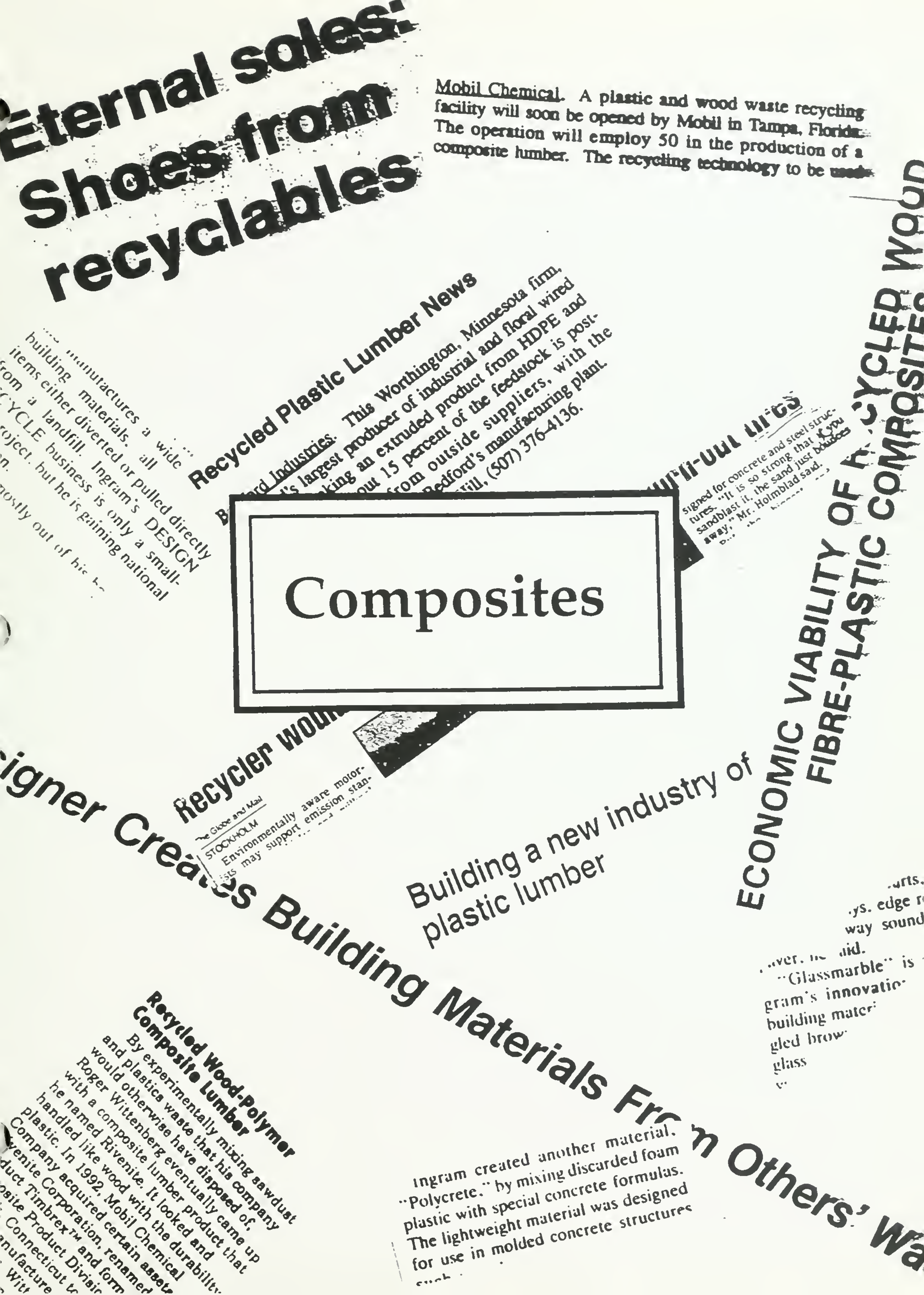
End Products

- upholstery (car, household, etc.)
- yarn
- cotton swabs
- mop yarns
- mattress pads
- underpadding for carpet
- automotive under floors
- padding for car roof interior
- padding under hoods (sound proofing)

Examples

- **EcoFibre Canada Inc.** of Niagara-on-the-Lake, Ontario, has developed a process for making yarn from recycled fibre (patent pending). The primary feedstocks used include mill waste and commercial fabric trimmings although used clothing can also be used. The recycled yarn is woven into several different fabrics, with recycled content ranging from 15-100%. EcoFibre commissions manufacturers to make products such as T-shirts, sweaters, bags, hats and scarves.
- **The Boston Preparatory Company**, a six-year old clothing manufacturer based in New York City, is planning to eventually buy recycled cotton fabric from EcoFibre and introduce a new fashion line.
- **Evergreen Recycled Garments** was launched in 1990 by a firm of wool recyclers in England. The company has been processing used garments back into fibre since 1970. The company employs eight people and processes about 10-15 tonnes of fibre each week. The principal use for the recycled fibres (about 75% of production) is for upholstery fabrics used in contract work for hotels and offices. The rest of the fibres are used to manufacture garments including coats, jackets, women's suits, a selection of knitwear and accessories such as caps, scarves and travel rugs. The **British Textile Technology Group** is promoting the garments on behalf of Evergreen. The group has published a number of statistics that show that this technology results in savings on water use, energy and costs.
- **H&I Carpets** in Toronto manufactures carpeting products from recycled material. A significant portion of the feedstock used for the carpet products come from the apparel industry. Products include: a nonwoven carpet used for automotive, geotextile and insulation purposes; underlay carpeting; and wool carpeting.

Composites



Eternal soles: Shoes from recyclables

Mobil Chemical. A plastic and wood waste recycling facility will soon be opened by Mobil in Tampa, Florida. The operation will employ 50 in the production of a composite lumber. The recycling technology to be used

Recycled Plastic Lumber News

Bedford Industries. This Worthington, Minnesota firm,
's largest producer of industrial and floral wired
king an extruded product from HDPE and
out 15 percent of the feedstock is post-
from outside suppliers, with the
Bedford's manufacturing plant.
Will, (507) 376-4136.

manufactures a wide
building materials, all
items either diverted or pulled directly
from a landfill. Ingram's DESIGN
CYCLE business is only a small-
roject, but he is gaining national
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ostly out of his

out tires

signed for concrete and steel structures. "It is so strong that if you sandblast it, the sand just bounces away," Mr. Holmblad said.

ECONOMIC VIABILITY OF RECYCLED WOOD FIBRE-PLASTIC COMPOSITES

Recycler wou

The Globe and Mail
STOCKHOLM
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Building a new industry of plastic lumber

signer Creates Building Materials From Others' Wa

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"Glassmarble" is
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Recycled Wood-Polymer Composite Lumber

By experimentally mixing sawdust and plastics waste that his company would otherwise have disposed of, Roger Wittenberg eventually came up with a composite lumber product that he named Rivenite. It looked and handled like wood with the durability of plastic. In 1992, Mobil Chemical Company acquired certain assets
venite Corporation, renamed
duct Timbrex™ and form
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Connecticut to
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Ingram created another material, "Polycrete," by mixing discarded foam plastic with special concrete formulas. The lightweight material was designed for use in molded concrete structures

Composites - Overview

Description

- "Composites" include products that are manufactured using mixed recycled feedstock (i.e. two or more different recycled materials, such as fibre and plastic).
- The range of composite products is potentially very broad although, at this time, most of the products in this category are construction materials (including substitutes for wood, concrete, plywood, particle board, wallboard, etc.).
- The designers/producers of these products often develop their own relatively unique product formulation and manufacturing methods. Several of these processes are proprietary, and in some cases the owner is attempting to sell or license the system to interested investors.

Current Market

- Composites represent a category of end products that have the potential to consume a wide variety of secondary material feedstocks (e.g. paper, plastics, used tires, construction and demolition wastes, etc.) Information on current end markets is provided in the material-specific sections of this manual.
- Some composites provide an alternative end market for recycled materials that are not source separated, of relatively poor quality, or too heavily contaminated for conventional markets.
- In general, the markets for composites are evolving as manufacturers attempt to introduce new products and develop specific market niches. This is a diverse sector, and market conditions vary by product type (see examples).

Issues/Trends

- Composites are potentially very important to recyclers, given the flexibility of feedstock requirements in many cases (i.e. the ability to accept mixed or variable feedstocks, or tolerate high contamination levels).
- Many of the manufacturers of composites must overcome negative perceptions and consumer resistance to the use of secondary materials. Information and education is important.
- At present, many composites are more expensive than conventional product alternatives. However, some offer advantages such as increased durability and product life. In addition, production costs can be expected to fall in many cases over time as feedstock sources develop and production levels expand.
- Regulatory barriers must be addressed for some products, particularly in the construction sector. For example, lumber and concrete substitutes must meet building code standards to achieve broad market access.

Feedstocks

- Virtually any feedstock can be used, although the most common feedstocks used in composites to date are blends of mixed plastics and waste fibres and, to a lesser extent, rubber and glass.
- Composite manufacturers can draw from a wide range of potential feedstock sources, including commercial, industrial and agricultural sources, as well as blue box recycling programs.

Composites - Overview cont'd.

Reuse/Recycling Processes

- Production processes are usually based on compression or extrusion. *Compression* typically involves heating a mixture of fibre and bonding agents such as glues or resins and applying pressure to form a board of uniform thickness. *Extrusion* involves forcing the heated mixture through a die to form a sheet. Several companies in the United States, Europe and Canada have been innovating in this area for several years, and adapting these basic processes to handle a mixed waste feedstock.
- Most of the ventures in this area to date have involved small-to-medium sized plants employing up to 20 people, although there are examples of larger operations in Europe and the United States (see examples). Start up costs vary widely, particularly because many of the innovators in this area develop their own equipment or modify existing machines to suit their needs.

End Products

- flooring for factories, barns, garages and other high-activity areas
- fences, railings, docks, breakwalls, parking lot car stops and many other outdoor applications where durability and weather resistance is required
- construction materials and products, including plywood, particle board, ceiling tiles, wallboard, etc.

Examples

- **Ray Woodhams**, a chemical engineer and **John Balatinecz**, a forestry specialist have combined efforts to make a lumber substitute using waste fibre (forestry by-products such as wood chips or waste paper) and waste plastic. The wood or paper waste is broken down into cellulose fragments, and then mixed with waste plastic products (polyurethane, polyethylene, polystyrene, polyvinylchloride and polypropylene). The lumber is made by injection molding or extrusion. A small pilot production plant is operational at the University of Toronto, and a full-scale production facility is now under development.
- **"Timbrex"** is a trade name for a product produced by **Mobil Oil Corporation**. Developed originally by an entrepreneur in Florida, this wood substitute is made from a 50/50 blend of post-consumer plastics (i.e. PE and HDPE) and wood waste (e.g. chipped pallets, waste paper, etc.). The plastic/fibre mix is heated, passed through an extrusion process and cooled to form a lumber-like material in whatever size is needed. Timbrex currently costs slightly more than pressure treated lumber at the retail level, but lasts longer and presents no problems with leachate. Company representatives expect prices to drop as production capacity comes on line. There is now one plant in Florida, several others in the development stages, and a backlog of orders.

Composites - Overview cont'd.

Examples

- **Plastiglass Industries Ltd** in Ajax, Ontario, introduced a building cladding material called "Stratum" in 1992 (patented). The product is used in retrofitting and renovating buildings and can duplicate any natural material. Stratum is made from 95% recycled content material and includes waste fibreglass, iron ore slag and crushed glass purchased from the City of Toronto. Currently, Stratum targets a high end market because the manufacturing process is expensive (the product is handmade). The price is expected to drop and have an advantage over competitors once sales grow and machinery is introduced for manufacturing. Plastiglass employs five people.
- **Enviroblock Surfacing Systems Canada Inc.** manufactures the "EnviroPaver", an interlocking surfacing block made entirely of used asphalt, crumbed tires and shredded waste plastics. The product is suited for high traffic areas such as inner city streets, maintenance yards and parking lots. Enviroblock has just opened a temporary plant in Mississauga with a processing capacity of 8 million square feet of blocks per year. The blocks will sell for abut $0.15 each — about half the price of conventional interlocking blocks. Enviroblock is planning to expand and is searching for a new location.
- **Aquapore Moisture Systems** in Phoenix, Arizona, makes a garden hose and a soaker hose from plastic and post consumer tires. Crumb rubber equivalent to more than 700,000 tires/year is supplied by a subcontractor to make the porous soaker hoses. The hose is made from a combination of recycled tire rubber and polyethylene in a patented process to ensure uniform water distribution.
- **A-1 Products** in Milton, Ontario, signed an agreement with CVL Products Ltd. in Thorold, Ontario, for a supply of Tyre-Plast, a compound comprised of scrap tire rubber and waste plastic. A-1 will manufacture blue boxes made of 25% recycled Tyre Plast tire crumb.
- **Durisol** in Hamilton, Ontario, manufactures a material which is moulded and compressed into a number of different products including: acoustic panels for highway noise barriers, industrial buildings, tunnels and airports; safety barriers for highways; wall and floor forms; and other concrete products. The products consist of over 70% recycled materials — the major components are recycled wood and cement. The company currently has two plants in the U.S. and one in Canada. Durisol employs between 45 and 65 people (depending on seasonal fluctuations).

een Plan

eds sink $100 million into environment industry

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nounced details of a $100-mill

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will award fundin
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egories:

DANGLING A CARR
FOR RECYCLERS

MORE THAN MONEY

NORTHWEST ECOENTREPRENEURS ELIGIBLE FOR GRANT FUNDS

The Pacific Northwest Pollution
Prevention Research Center in

*Businesses can take
advantage of
economic
development
rograms to create
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bonds to make the project possible,"
says Peter Marcalus, Marcal's vice pres-
ident of corporate comm
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BUSINESS COOKS
THE KITCHEN CENTER

Business Incuba-
ened in 1985 as
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design or advice on supplies
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Financing

FINANCING
A RECYCLIN
BUSINESS

THE NATION'S movemen
away from landfilling an
waste-to-energy incineratio
of solid waste has brought
new emphasis on recycling
an environmentally resp.
ble method. It has also made recyc
what many experts consider to be

NDS TO EXPAND
RECYCLABLE MARKETS

Funding is available to develop
and expand markets for recyclable
materials through Pennsylvania's

FINDING CAPITA

EQUITY FINANCING
FOR MIDDLE MARKET
COMPANIES

LOANS AND GRANTS

INTERNATIONAL
ECOVENTURE FINA

Companies involved in o
ering international environme
business may not realize that m
is available from the U.S. govern

AUGUST 25, 1992

Denver Has Economic Assistance
Local Business in the Market

By Kathleen M. White

nver wants recycling businesses to
or expand in its vicinity and is
ve will offer economic assist-

nomic assistance and no cap on how
many businesses we can accept,"
Reins said. Right now the city
gauge its plan based on
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THE NEED to assist thos
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Bangladesh visio

Financing New Business

There are three generic sources of funding or capital for new businesses:

1. Chartered Banks
2. Government Assistance Programs
3. Venture Capital

CHARTERED BANKS

Banks lend money on the basis of equity or assets securing the loan (for smaller companies especially).

GOVERNMENT ASSISTANCE PROGRAMS

Government assistance programs are available from all levels of government (federal, provincial and municipal), and include grants or contributions, forgivable loans, incentive loans (e.g. low or no interest bearing principal or interest deferral), repayable contributions, loan guarantees, technical assistance and even equity participation.

Keys to Ensuring Application Review

Address the following program objectives:

- creation of net new jobs;
- potential for increased exports;
- replacement of imports;
- amount of risk attached;
- activity involving R&D;
- improved cost efficiency and/or energy savings;
- potential for economic benefit to a slow growth area of Canada (in some cases, this may include maintaining existing jobs).

The Proposal and its Presentation

The most effective applications involve the entire management team in the presentation. Applications should demonstrate:

- the technical, marketing, manufacturing, financial and managerial skills necessary;
- benefits to Canada (including employment, expansion of exports or reduction of imports, expansion of other industries and services and the use of Canadian manufactured goods.

Keep in Mind...

- *The fact that banks lend money on the basis of equity or assets rules out most start-ups, unless business owners have personal property (residences, securities) to pledge against the loan.*
- *Many entrepreneurs don't have this luxury, or if they do, banks may still be reluctant to make loans to new, unproven businesses.*

Keep in Mind...

- *Funding is usually given on a matching basis, i.e. providing grants up to the equivalent of 50% of new capital contributed to the business.*
- *It's important to note that this is based on new capital to be invested at the time of application and not on capital previously invested — it is therefore important that an early approach be made to government, ideally at the conceptual stage of the project. It is preferable to do this in face-to- face meetings with program officers.*
- *The intent of government assistance is to provide an incentive or lever to spark promising ventures that would otherwise languish due to the degree of risk or the difficulty of raising private sector funding. Therefore any indication that the company will proceed with the project irrespective of government assistance will usually eliminate the company from eligibility.*

VENTURE CAPITAL

Venture capital refers to a wide variety of investors and investment types, but generally refers to capital invested in businesses in return for high rates of return to reflect the higher amount of risk in the investment.

Types of Venture Capital

Seed financing
- provided to prove a concept — may involve some product development

Start-up financing
- provided for use in product development and initial marketing
- companies usually have not yet sold their product commercially, yet would have assembled key management and prepared a business plan

First stage financing
- provided to companies that have expended their initial capital and started to sell product, but require additional funds to initiate full commercial production/sales

Second stage financing
- supports initial expansion of companies that are making progress but may not yet be profitable

Mezzanine financing
- provides capital for major expansion (plant expansion, marketing, working capital or new product development)

Leveraged buy-out financing
- provides capital to enable operating management or outside investors to acquire a product line, division or company

Keep in Mind...

- *In most cases, capital is invested in return for a portion of ownership or equity in the company.*
- *Investors will not normally look to dividends or interest to provide the return on investment, but will look to capital gain or an increase in the value of shares.*
- *Venture capital can come from individual investors, or large companies specialized in the type of businesses in which they'll invest.*
- *Venture capitalists looks for entrepreneurs and companies that will in time become medium and large companies.*
- *These are generally expected to be long-term investments (3-8 years).*
- *Most large venture capital companies tend to specialize in high tech industries and/or existing businesses requiring capital to finance expansion.*
- *Obtaining funding for start-up businesses can be very difficult and most venture capital companies do not invest in start-up situations.*
- *Entrepreneurs will have more luck obtaining capital from individual investors or small companies that have a history of investing in new businesses (these investors are called "angels").*
- *Another source that should be considered for start-ups is large companies in related industries that will benefit from the development of the entrepreneur's idea (e.g. McDonald's has invested capital in new technologies or projects that assist it to address its waste problems). This can often be the best source of capital as these companies have set aside funds for R&D and are prepared to accept a higher amount of risk.*

The Business Plan

The business plan is a written summary of your proposed enterprise which will be necessary regardless of which type of financing you pursue. It reports on the company's sources and uses of funds, management personnel, labour relations, products, marketing strategy, production techniques and research — it describes the past, present and future of your operation.

Must Address:

- viability in the context of the proposed project (i.e. does it make sense?);
- credibility (relating the company's ability to successfully carry out the project);
- and social responsibility (as outlined above).

Details of a Business Plan:

The purpose of the business plan is to provide an overview of:

1. the opportunity
2. the size and projected size of the market over an extended period
3. what your competition is, and
4. how you will fill a niche
5. how you plan to develop that market
6. where you will be after each of the first 5 years, ten years, etc.
7. how will you produce your product
8. how will you price it
9. what will the costs of producing it be
10. what will be your operating costs
11. what are start-up or fixed costs

Also include:

- tables showing revenue and operating cost projections for a minimum of 5 years and cash flow projections for 5 years
- start-up costs for land, buildings, leasehold improvements, equipment, inventory, etc.
- projected balance sheets for the end of the first 5 years and 10 years

Common Weaknesses:

- failure to focus on critical issues — get to the point; avoid flowery language; use appendices to provide details
- failure to explain both good and bad track records — don't over-emphasize good track records nor gloss over poor track records
- failure to justify R&D expertise — why is your company the best qualified to do the project from an R&D standpoint?
- failure to complete adequate market analysis — who will buy what, and when and where will they buy?
- failure to do sensitivity analysis — illustrate what the expected financial results will be if both pessimistic and optimistic forecasts are included
- failure to reconcile sales forecasts to manufacturing capacity and staffing levels —inadequate attention to capital and staffing requirements necessary to service optimistic sales forecasts in the future
- failure to recognize the effect of the proposed project on the environment in which the company operates — businesses do not operate in a vacuum. What will be the effect of the project on the local community, competition, etc.
- failure to qualify market share or sales growth predictions over the business plan period

Keep in Mind...

- *Once you've prepared the business plan, patience and persistence are needed.*
- *Even once you've identified a potential investor, it can take several months to reach an agreement and actually obtain money.*
- *Be realistic regarding what you must give up in return for investment capital, e.g. if you require a high amount of capital relative to what you've already invested, private investors will expect a share of ownership that reflects their portion of contributed capital — so this may require giving up a certain amount of control (remember it's better to have 30% of something than 100% of nothing).*

Resource List

Funding

- **Industrial Assistance Programs in Canada,** 1989. CCH Canadian Limited, Don Mills, Ontario M3C 1Z5 (416)441-2992.

  This book includes keys to securing government assistance, case studies illustrating the various government assistance programs in actual business situations, program descriptions for more than 100 major federal and provincial programs, and a listing of municipal contacts thoughout Canada.

- **The Ontario Investor Series: Selected Assistance Programs for Business,** 1992, Ontario Ministry of Industry, Trade and Technology.

  A more condensed version of the above — this booklet provides information on 33 federal and provincial level funding programs, including information on the purpose of the program, eligibility, available assistance and contacts.

Venture Capital

- **Venture Capital in Canada: A Guide and Sources.** Industry Science and Technology Canada, 1989.

  This booklet defines venture capital, describes how to raise it, gives sources of venture capital, and profiles some Canadian success stories.

General Business

- **Starting a Small Business in Ontario,** Ontario Ministry of Economic Development and Trade, 1-800-268-7540.

  This book is intended to make prospective business people aware of the basic requirements, and assist them in evaluating both themselves, and the business being contemplated.

- **Small Business Success: A Practical Guide for the Entrepreneur.** TESLE Enterprises, Inc. CCH Canadian Limited, 1990.

  A collection of practical articles on business topics such as management, cash planning and borrowing, other financial issues, and other important issues (e.g. consulting, computers, competition, hiring etc.)

- **How to prepare a Business Plan,** Ontario Ministry of Economic Development and Trade, 1-800-268-7540.

  This book is available through Publications Ontario.

- **Business and Entrepreneurship Courses.**

  Check with post secondary educational institutions in your area.

Government Assistance Programs

The following government assistance programs are the most relevant to the type of ventures discussed at this workshop. *Please note that these programs are subject to change.*

DRECT (Development and Demonstration of Resource & Energy Conservation Technology) — Federal

Purpose:

A cost-sharing program to encourage the development and demonstration of new technology designed to reduce or eliminate the generation and disposal of wastes.

Eligibility:

- private sector companies and organizations
- municipal authorities developing innovative methods, procedures, processes or equipment

Assistance:

- up to 50% of total estimated costs including equipment, buildings, installation, engineering, consulting and lab services
- funding for any project limited to $200,000/yr (for a maximum of 3 years)

Contact:

Environment Canada, DRECT Program Manager (819) 953-7827

IRAP (Industrial Research Assistance Program) — Federal

Purpose:

IRAP is designed to help small and medium firms to be more technologically competitive in domestic and international markets.

Eligibility:

- small and medium-sized Canadian firms
- IRAP assists manufacturing, resource, construction and service industries

Assistance:

- this program involves a network of over 250 Industrial Technology Advisors (ITA's) across Canada who help firms access technical expertise and other sources of federal and provincial assistance
- the program also provides financial contributions to R&D projects of individual firms

Technology Enhancement:

- limited to $15,000 contribution per project
- will cover up to 50% of eligible project costs (usually in-house salaries or costs of subcontractors or consultants)
- eligible activities include: technical feasibility studies, small scale R&D, short term technical assistance, technical analysis and problem solving, projects or problem solving using a university or college level engineering or science student, technology transfer to industrial associations, links of small firms to larger ones

Government Assistance Programs cont'd.

Research, Development and Adaptation:

- $15,000 to $350,000, covering up to 36 months
- projects must include plans for commercial exploitation
- eligible activities include: R&D projects up to and including test model or pilot plant stage, adaptation of existing technologies of proven technical merit, linkages with external agencies which could be a source of technology or technical assistance

Contact:

National Research Council (416) 570-7175.

Technology Inflow Program — Federal

Purpose:

To promote international collaboration that will provide the technical innovation needed to develop new or improved Canadian products, processes or services. To facilitate the flow of foreign technology to Canada. To provide Canadian scientists and engineers with financial support to assist them to gain first hand knowledge of foreign technologies relevant to their needs.

Eligibility:

- available to all organizations; the main recipients will be small to medium-sized enterprises whose resources and international networks and contracts are limited
- non-federal government applicants should arrange sponsorship of their proposals by a federal department with an interest in the proposed activity

Assistance:

- specific requests from Canadians to identify technology sources and investigate opportunities for collaboration are looked at including:
  - short-term exploratory missions and visits to initiate and develop international collaboration;
  - missions by experts to collect information on emerging technologies of economic interest to Canada;
  - working visits of up to 5 months by Canadians to foreign labs or research establishments to obtain hands-on experience;
  - working visits of up to 1 year by foreign information technology experts in Canadian laboratories or research institutions where the Canadian orgnaization will gain significant benefit from the visitors' expertise;
  - international, shared-cost, co-operative research projects in the information technology field designed to produce new technologies of interest to Canada or to adapt Canadian technology to the need of other countries.

Contact:

Technology Inflow Program Manager, Department of External Affairs (613) 996-0971 or National Research Council (416) 570-7175.

Government Assistance Programs cont'd.

Federal Business Development Bank (FBDB) — Federal

Purpose:

FBDB offers term loans to allow its customers to acquire fixed assets such as land, buildings, machinery and equipment. In some cases, term loans can be made to replenish the working capital of a business when it has been depleted by recent capital expenditures.

Note: The FBDB has recently established a venture capital division specializing in early stage proposals with higher risk (minimum $500,000; average $1.5 million). It features a 30% return goal, with a 5 to 7 year timeframe. Prefer co-financing.

Eligibility:

- the business must be operating in Canada
- must reasonably be expected to prove successful
- investment in the business must be such that the owners will have a continuing commitment to the business enterprise

Assistance:

- FBDB attempts to structure loan repayment terms according to the client's cash flow

Contact:

FBDB (416) 572-2959

Environmental Innovation Program —Federal

Purpose:

The EIP is designed to promote Canadian environmental innovation outside government.

Eligibility:

- Canadian industry, universities, native groups, non-government organizations and interested individuals
- areas of natural sciences, social sciences and human health sciences

Assistance:

- projects must be co-sponsored by another government department, agency or other source
- must address an environmental issue contained in the Green Plan
- must be unique
- must advance the knowledge base, understanding or scientific state of the art on an issue

Contact:

Program Officer, EIP (819) 956-1774.

Government Assistance Programs cont'd.

Business Improvement Loans — Federal

Purpose:

A program designed to help new and existing small business (less than $5M gross revenue/yr.) entrepreneurs obtain term loans from chartered banks and other lenders toward financing the purchase and improvement of fixed assets.

Eligibility:

- must be operating for profit
- excludes farming, renting or purchase for resale of real estate and charitable or religious enterprises

Assistance:

- land loans, premises loans, equipment loans
- loans may not exceed $250,000.

Contact:

Small Business Loans Administration, Industry, Science and Technology Canada, 235 Queen St., Ottawa, Ontario K1A 0H5.

New Ventures Loan/Youth Venture Capital — Provincial

Purpose:

The N.V.L.P. has three goals: to promote success for new businesses; to provide access to funding through loan guarantees; and to ensure that entrepreneurs have fully researched their idea with a comprehensive business plan.

Eligibility:

- must be starting up a new full-time business
- must make a cash equity contribution to the business at the time of loan approval, equal to the amount of the loan

Assistance:

- at some time during the term of the loan, at least one full-time employee must be hired
- the loan must be used to cover essential start-up costs
- loans of up to $15,000 guaranteed by the Ontario government
- in the 1st year, pay interest only; 2nd year begin to pay back loan principle

Contact:

New Ventures Program 1-800-387-0070
Youth Venture — a loan of up to $7,500 for people 18-29 years of age 1-800-387-0777.

Government Assistance Programs cont'd.

Environmental Technologies Program — Provincial

Purpose:

The ETP is designed to encourage Ontario organizations to get involved in protecting and improving the environment.

Eligibility:

- organization must be operating/residing in Ontario
- projects that fall under this program include research leading to the development of an innovative process, product or equipment prototype
- environmental technologies developed elsewhere may be tested for their suitability to Ontario conditions
- categories of technologies, products and processes eligible for funding:
  - tire recycling; the 3R's (reduction, reuse and recycling); waste management; analytical instrumentation; waste and sewage treatment; air pollution control and socio-economic analysis

Assistance:

- most projects will take 3 years or less to complete
- funding will not exceed 50% of the total cost
- contributions will usually be less than $500,000/year
- both direct and indirect project costs may be eligible — basic research is not eligible; nor are commercialization, full-scale production or marketing costs eligible

Contact:

MOEE, Fiscal Planning and Information Management Branch (416) 323-4657

Environmental Technologies Commercialization Program — Federal

Purpose:

To share the financial risks of developing, demonstrating and commercializing new technologies to solve environmental problems though the use of first-time pilot and demonstration projects.

Eligibility:

- project sponsors will be for-profit corporations and partnerships operating in Canada that represent an alliance and have the capacity to successfully demonstrate and commercialize new environmental technology

Assistance:

- up to 50% of eligible costs; to a maximum of $5 million

Contact:

Program Manager, Industry Canada (613) 954-3242.

Government Assistance Programs cont'd.

Industrial Waste Diversion Program — Provincial

Purpose:

Must clearly demonstrate that it will result in the diversion of waste from disposal using the 3R's.

Eligibility:

- private sector industries, commercial operations and institutions
- available for hazardous or liquid industrial waste and for non-hazardous waste projects considered strategic by the Ministry
- higher amounts available for projects that divert large quantities of hazardous waste and impact on the province's diversion goals; where the technology is unproven; in a geographic area that has few diversion activities underway; that divert a material not presently being diverted; that divert waste the Ministry deems a priority
- note ineligible projects include: non-hazardous waste diversion projects that are not of strategic importance to the Ministry including routine collection, separation and processing of OCC, collection, separation and processing of blue box materials and home cloth diaper services
- ineligible costs include: market/product/economic feasibility studies; preparation of business plans; product development/product market development or manufacturing of a specific consumer product
- equipment of work ordered prior to application is not eligible for funding

Assistance:

- capital costs up to a maximum of 50% for eligible equipment
- up to a maximum of 50% for installation and commissioning costs associated with equipment
- up to 100% of eligible costs of a project that deals with applied research, demonstration and evaluation of a technology or porcess which results in the diversion of waste
- ineligible costs

Contact:

IWDP Toronto 1-800-268-4483.

Technical Personnel Program — Provincial

Purpose:

This program focuses on increasing the technical or scientific expertise and the application of new technology within Ontario businesses.

Eligibility:

- company must be in manufacturing or service sector and employ 10-200 employees
- the company must be incorporated and must export goods or services
- the company must be at least two years old
- the company must lack qualified technical staff to carry out a specific project
- prospective employee must be a scientist, engineer, technologist, technician or industrial designer
- assistance up to $45,000 to contribute to hiring a new technical or scientific employee for a minimum of 3 years

Contact:

Ontario Ministry of Economic Development and Trade (416) 325-6840 or (416) 521-7783.

Government Assistance Programs cont'd.

Innovation Ontario Corporation—Provincial

Purpose:

To assist the development of early stage, technology based businesses to a point where they can attract private sector investment sufficient to ensure sustained growth and profitability.

Eligibility:

Any Ontario-based company can apply.

Assistance:

- normal investments made by Innovation Ontario range from $200,00 to $500,000 for companies assessed as having significant growth potential. Ontario employs one of two financial instruments when it participates in a business, namely;
- Royalty Agreements where the company agrees to pay Innovation Ontario a percentage of its sales;
- Share Purchases where Innovation Ontario's investment is used to purchases percentage of the ownership of the business.

Contact:

Innovation Ontario Corporation (416) 326-1025

Ontario Development Corporation—Provincial

Purpose:

- The program provides loans or loan guarantees for expansion, modernization and start ups in manufacturing, tourism and service industries supporting secondary manufacturing. Assistance is provided for capital acquisitions such as equipment and machinery or for plant expansions.

Eligibility:

- Corporation loans and loan guarantees are available to small and medium sized manufacturing and processing firms that are experiencing difficulty in obtaining part or all of their financial requirement from the private sector.

Assistance:

- Term loans of up to $500,000 are available

Contact:

Ontario Development Corporation (416) 326-1070

Procurement

Creating Demand for Recycled Products

PURCHASE POWER

How to Make Demands of Suppliers for Greener Products

Federal Government Becomes Big Buyer of Recycled Paper

Alliance of Major Businesses Pushes 'Buy Recycled' Effort

By Kathleen M. White

Twenty-five multi-national corporations have formed a voluntary alliance with the

kets, but this is the initial effort. Market development is the remaining ingredient for progressive solid waste

Cooperative Buying Programs May Help

FORTUNE 500 TO SPEND BILLIONS ON RECYCLED

A survey of 924 purchasing managers at Fortune 500 companies indicates that they intend to spend $3.628 billion on recycled-content products this year and $3.433 billion on waste

HOW ONTARIO'S PURCHASING POLICY LOOKS ON PAPER

Recycling Times

ecycled Products' Purchase Pushed in Every State

By Kathleen Meade

All 50 states and Washington, D.C., has some sort of policy in place that favors buying recycled products in gov-

tion. In 1986, when NRC completed a similar state analysis, only 13 states had been identified as having recycled buying policies.

"It indicates the fact that the stat

Keller said, but some include other products such as plastics and re-refined oil. Twenty states also give price pref- for recycled products, which government to buy a re-

recycled products that cost up to 5% more. South Carolina's price preference goes up to 7.5%. Alaska, Connecticut, D.C., Florida, Michigan, Missouri, Mississippi, New Jersey.

State Green-Product Procurement Laws

GOVERNMENTS PURCHASING RECYCLED PRODUCTS

Companies Raise The Banner Of "Buy Recycled"

Major American corporations belonging to the Buy Recycled Alliance have discovered that within their their corporate walls rests an untapped market — recycled material and product procurement.

Procurement

The Opportunity

Both governments and private corporations have the ability to influence manufacturers to develop recycled content capability, to develop greater capacity, to invest in recycled products research and to risk the introduction of new technologies. Canada's pulp and paper industry is a good illustration of this leverage. New de-inking capacity now coming on stream (approximately $1 billion in new investment) in Canadian pulp and paper mills is a result of demand from *the purchasers of the paper products*, who insisted on recycled content. This insistence was the catalyst for the mills' investment in the capability to process post-consumer wastepaper into new recycled content paper products. In this fashion, governments and private companies are able not only to provide secured markets for recyclable materials, but are also able to provide local economic development opportunities.

Types of Purchasing Policies

Phased In Program

- involves buying a small percentage of recycled content product the first year, with increasing percentages in the following years
- allows opportunity to test the product, find suitable uses for it, adjust equipment if necessary, and allow employees to become comfortable with it

Set Aside Program

- requires procurement office to award a specified percentage of its purchases to vendors of a preferred product, regardless of price

Co-operative Purchasing Program

- small quantity purchasing of recycled content products may sometimes be uneconomical
- cooperative purchasing among governments and corporations may make this economically feasible; such agreements can ensure favourable prices and delivery guarantees

Price Preference Program

- allows a procurement office to pay a higher price if necessary to obtain a recycled content product
- in order to initially encourage industries to invest in using reclaimed materials in making a new product, you may wish to implement a policy whereby your purchasing department offers to pay a higher price for a recycled product than for a virgin one — these preferences need not exceed 5 or 10%

Dual Track Bids

- allows both recycled content and virgin product vendors to bid on a contract
- if the recycled bid wins, the contract is let to that bidder and if the virgin material bid wins, the bidder receives the contract, but then a second contract is also awarded to the lowest priced recycled content bidder
- this ensures availability of recycled content product, although at a higher cost

Types of Products

- text and cover
- xerographic
- cotton fibre
- mimeo
- offset
- stationery
- envelopes
- book papers
- computer paper
- coated
- newsprint
- computer paper
- directory paper
- writing tablets
- interior and hanging file folders
- report covers and portfolios
- business pads
- pressure sensitive labels
- posterboard
- desk top accessories
- padded mailing envelopes
- mailing tubes
- kraft envelopes
- packing material
- corrugated and fibre boxes
- kraft wrapping paper
- kraft bags
- protective packaging (moulded fibre)
- toilet tissue
- paper towels
- paper napkins
- facial tissue
- industrial wipes
- food service trays and plates
- cellulose
- fibreboard
- perlite board
- mineral wool
- fibreglass
- wall panels
- toilet and shower partitions
- insulation support
- drain pipe
- culverts
- irrigation pipe
- geotextile sleeves
- fencing
- lumber
- roofing
- floor tiles
- reflective paint
- sandblasting medium
- aggregate
- building blocks
- glassphalt
- electromagnetic filters
- compost/mulch
- hydroseeding
- composters
- landscape timbers
- wood chips
- barn lining
- pens
- slatted floors
- drain tile
- mats
- truck bed mats
- traction pads
- curbside boxes
- returnable containers
- collection bins
- garbage bins
- buckets
- park benches
- picnic tables
- fencing
- playground equipment
- privies
- stadium seating
- decking
- athletic fields
- speed bumps
- parking stops
- traffic barricades
- snow fencing
- road markers
- tree protectors
- sound barriers
- paving products
- all types of auotomotive and lubricating oils
- rubber asphalt
- athletic surfacing
- crack sealant
- hosing
- carpet underpad
- dock bumpers
- erosion control
- temporary access roads
- industrial blasting mats
- agricultural and recreational mats
- retread tires
- pallets
- wood chips
- animal bedding
- oil spill absorbent

5 Steps to Stimulating the Market for Recycled Products

Step 1. Policy Commitment

There is a need for the organization to express a firm commitment to the development of a comprehensive program. This policy resolution should include a commitment to the purchase of recycled products, as well as reusable and recyclable materials, where feasible. The board should express to department heads its intention to pursue a procurement program favouring recycled products — past experience has proven that this commitment by top management is essential.

G.I.P.P.E.R.'s Statement of Principle is one example of a policy commitment:

> "In order to contribute to waste reduction and to increase the development and awareness of environmentally sound purchasing, acquisitions of goods and services will ensure that wherever possible specifications are amended to provide for expanded use of durable products, reusable products and products (including those used in services) that contain the maximum level of post-consumer waste and/or recyclable content, without significantly affecting the intended use of the product or service. It is recognized that a cost analysis is required in order to ensure that the products are made available at competitive prices."

Tips

- *Put the commitment in writing.*
- *Tout the program on the basis of cost-savings, efficiency and market advantage.*

Step 2. The Procurement Policy

Provisions to be included in a procurement policy include: a review of existing purchasing policies to be certain they do not exclude the use of recycled materials and/or products designed to be reused or recycled, a requirement that all departments/agencies modify purchasing policies to promote procurement through price preferences, set asides or requiring that certain products always be purchased with recycled content (unless unavailable), and a resolution to co-operate with neighbouring companies/governments to stimulate markets for recycled products. This co-operative effort is important since more manufacturers will be willing to accept the investment risk involved in producing new product lines if the cumulative demand is large enough. Also, the use of brokers or common purchasing agents can reduce management costs, can result in possible price concessions, and lead to improved information exchange among purchasers. Appendix A includes a sample recycled product procurement policy.

Tips

- *Existing specifications which require "new or virgin materials only", "no recycled materials" or "no recovered materials" should be amended to include the maximum recycled content (especially post-consumer) and salvaged materials where practicable.*
- *Purchasing policies should contain measurable goals and objectives (e.g. specified recycled content levels where appropriate) — purchasing levels that are too low will not force manufacturers to increase their use of recovered material; if you set the levels too high, it can make it difficult for a sufficiently large number of manufacturers to bid on your supply contract.*
- *Try not to establish requirements which are unnecessarily stringent for the product involved, e.g. you may want to rethink the rationale for extremely bright paper — it is very difficult for post-consumer recycled content paper to achieve high levels of brightness.*
- *If your company is a small customer, work though your industry's trade association to team up with other companies in your industry to maximize your buying power.*

Step 3. Decide What to Buy

First, purchasers must determine what products are consumed in their organization. It will then be necessary to determine what recycled content products are available, and to test the available products. Purchasers should encourage the development of new products through their bidding process. Things to keep in mind when deciding what to buy are to start with the easiest measures first, and not to sacrifice performance in favour of recycled content.

Tips

- *Avoid materials for which no collection/recycling facilities currently exist.*
- *Eliminate or replace all hazardous materials and products requiring the use of hazardous chemicals in their production.*
- *Materials chosen should meet all requirements for intended use, performance criteria and appropriate regulations and standards (CSA, building codes, product health and safety requirements, etc).*
- *When evaluating cost effectiveness of alternatives, environmental costs should be taken into consideration.*
- *See G.I.P.P.E.R.'s listing of environmental factors which should be considered by purchasing staff in Appendix B.*

Step 4. Procurement Specifications, Contracts and the Bidding Process

The first step in revising your procurement specifications will be to review existing specifications to eliminate prohibitions and overspecificity. Then you will need to establish minimum content standards, and apply price preferences or set asides. Remember to consider life cycle costing in your decisions. Also keep in mind that it's within your power to open the door for smaller firms — as it is they who often demonstrate the flexibility to meet the demand for recycled products.

Tips

- *At a minimum, inform your existing vendors in advance that solicitations will include a recovered materials requirement.*
- *Make environmental issues an agenda item in meetings with suppliers.*
- *Where possible, deal with suppliers/manufacturers who have implemented environmental policies and operating guidelines.*
- *Ask the supplier for help in coming up with solutions — good suppliers will generate ideas and may have access to products you don't know about.*
- *Sample questions to ask suppliers/manufacturers include:*
  - *do they have an environmental policy statement?*
  - *what is their history on environmental and safety issues?*
  - *can they justify all their environmental claims?*
  - *what waste reduction programs does the company have in place? do they have further plans for environmental improvement?*
  - *if using recycled materials, what is the %, source (domestic or foreign, local or not), and type (post-industrial, post-consumer) of recycled material content?*
  - *has the supplier conducted a comprehensive waste audit?*
  - *does the supplier conform to MOEE regulations and all other applicable legislation and regulations?*

- *Factors that might appear in tender terms and conditions include price, economic and environmental impact (e.g. unnecessary packaging), production processes used, energy use, maintenance, and disposal requirements.*
- *Structure multiple bids covering different grades of product in smaller increments so that recycling mills and oil re-refiners which may not produce all grades and may not have the capacity to supply all of your needs will not be shut out of the bid process.*
- *To ensure quality, ask suppliers and contractors to provide representative samples of materials as well as names of previous users of product/service — consider use of new products on a trial basis until performance and technical requirements have been proven.*
- *All supplier/manufacturer claims should be supported with appropriate documentation on first time buys e.g. test results, sources of recycled content — see sample product verification form developed by ACCESS (Association of Canadian Cities on Environmentally Sound Strategies) in Appendix C.*

Step 5. Follow-up

Follow-up will require monitoring of your program's success. This may include surveying users to uncover and respond to any resistance to the products after they are introduced. It is also important to identify any other barriers to successful procurement, and of course, to be aware of the successes.

Tips

- *Review your recycled content standards regularly to ensure that they do not become too low as more suppliers of higher recycled content products come onto the market.*

Selected Procurement Terms

Life Cycle Costing: The process of economic analysis to assess the total cost of system investment and ownership, taking into consideration the operational constraints and performance requirements of the system or product under study.

Post-Commercial and/or Pre-Consumer Waste: Waste generated after the product leaves the manufacturer, but before the final end use of the product, e.g. printers off-cuts and trimmings.

Post-Consumer Material: Material or item generated by households and industrial, commercial and institutional (IC&I) facilities which has served its intended purpose and can no longer be used. Does not include in-plant utilization of materials generated within the plant and capable of being reused within the process that generated it.

Recyclable: Products made from materials which after use can be diverted from the waste stream and recycled into a new product. For labelling purposes, a product or package may be deemed recyclable where at least 33% of the population across Canada has convenient access to collection or drop-off facilities for recycling of that product, or where a product is produced for a regional market that 33% of the population in that market has convenient access to collection or drop-off facilities for recycling.

Recycled Percentage: It is not enough to simply express a preference for recycled products. Some products may be entirely composed of recycled materials and some may be a combination of virgin and recycled materials. The recycled percentage is a number from 0-100% that indicates the portion of a certain material within a product that is derived from secondary waste.

Resources

Environmental Choice Program
Environment Canada
107 Sparks Street, 2nd floor
Ottawa, ON K1A OH3
(613) 952-9439

- *labelling program which helps to identify products that ease the burden on the environment*

Guiding Principles for Environmental Labelling and Advertising
Consumer and Corporate Affairs Canada
Chief, Merchandise Standards Division
Consumer Products Branch
Place du Portage, Phase 1
50 Victoria Street
Hull, PQ K1A 0C9
(819) 997-1177

- *provide recommendations that will ensure that consumers are provided with the necessary information to make informed product comparisons*

Canadian Code of Preferred Packaging Practices
Ontario (416) 323-4321

- *guides industry in achieving the goals of the National Packaging Protocol*

G.I.P.P.E.R.
Directory of Environmentally Sound Products and Services
Department of Purchasing and Supply
Toronto City Hall
18th floor, West Tower
Toronto, ON M5H 2N2
(416) 392-7311

- *produce G.I.P.P.E.R.'s Guide to Environmental Purchasing which covers cleaning products, compost, construction and demolition materials, paint and paper, and packaging*

Environment Canada
Supply and Services Canada
Open Bidding Service (OBS)
Environmental Goods and Services Section
1-800-361-4637
OBS Hotline (819) 956-3440

- *a national electronic bulletin board system that advertises federal procurement needs (currently advertise about $4 billion worth of goods and services/yr)*

Sample Recycled Product Procurement Policy

1. Within 12 months of the effective date of this section, all departments, agencies, offices, boards and commissions must conduct a review of existing product and service specifications to determine whether existing specifications either require the use of products manufactured from virgin materials or exclude the use of recycled products, reusable products, or products designed to be recycled.

2. In the event that such specifications do exclude the use of recycled products or require the use of virgin materials, then such exclusions or requirements must be eliminated unless the pertinent department or entity can demonstrate that these recycled products would not achieve a necessary performance standard.

3. Within the same 12-month period, all departments and agencies must recommend changes to ensure that performance standards for particular products can be met and that specifications are not overly stringent, and to recommend changes to ensure that specifications will incorporate a requirement for the use of recycled materials, reusable products and products designed to be recycled to the maximum extent practicable, subject to an alternative showing that either the performance of the product will be jeopardized or that the product will negatively impact health, safety or operational efficiency.

4. Outside contractors bidding to provide products or services, including printing services, must demonstrate that they will comply with the specifications described in paragraph three to the greatest extent feasible.

5. Staff will work to encourage the copier industry to develop high-speed copiers that will accept recycled paper. In addition, recycled paper shall be purchased and used in all copy machines that will accept it.

6. When recycled products are used, reasonable efforts shall be undertaken to label the products to indicate that they contain recycled materials. Departments and agencies shall use for their masthead stationery and envelopes recycled paper that includes post-consumer recycled content and which indicates on the paper and envelopes that they contain recycled material. Other recycled products used should also indicate that they contain recycled material to the extent practicable.

7. A 10% or greater price preference may be given to recycled products, reusable products offered as alternatives to disposable products, and products designed to be recycled where they are offered as alternatives to non-recyclable products. The preference percentage shall be based on the lowest bid or price quoted by the supplier or suppliers offering non-recycled products.

8. The organization will co-operate to the greatest extent feasible with neighbouring city and county governments and businesses in an effort to develop a comprehensive, consistent and effective procurement effort intended to stimulate the market for recycled products, reusable products, and products designed to be recycled.

Environmental Procurement Considerations

General Environmental Criteria for all Products

- Is the product size/magnitude necessary?
- Are all the features of the product necessary? Can any features be eliminated, especially the environmentally harmful ones (e.g. cosmetic plastic coating on paper products)?
- Is there a suitable alternative which is less harmful to the environment and safe to use?
- Is the product designed to be durable/long-lasting?
- Are recycled materials used to produce the product?
- Does the product contain any banned or restricted substances (e.g. CFC's)?
- Does the product contain any exotic/endangered materials?
- Is the product reconditionable or recyclable following use?
- Does the product require special disposal considerations (e.g. hazardous materials)?

Environmental Considerations for Durable Products

- Is the product energy efficient?
- Are there any components of required maintenance environmentally damaging?
- Is the product designed for easy maintenance and repair?
- Are recycled materials used to produce replacement parts?
- Are replacement parts reconditionable or recyclable (e.g. laser printer cartridges)?

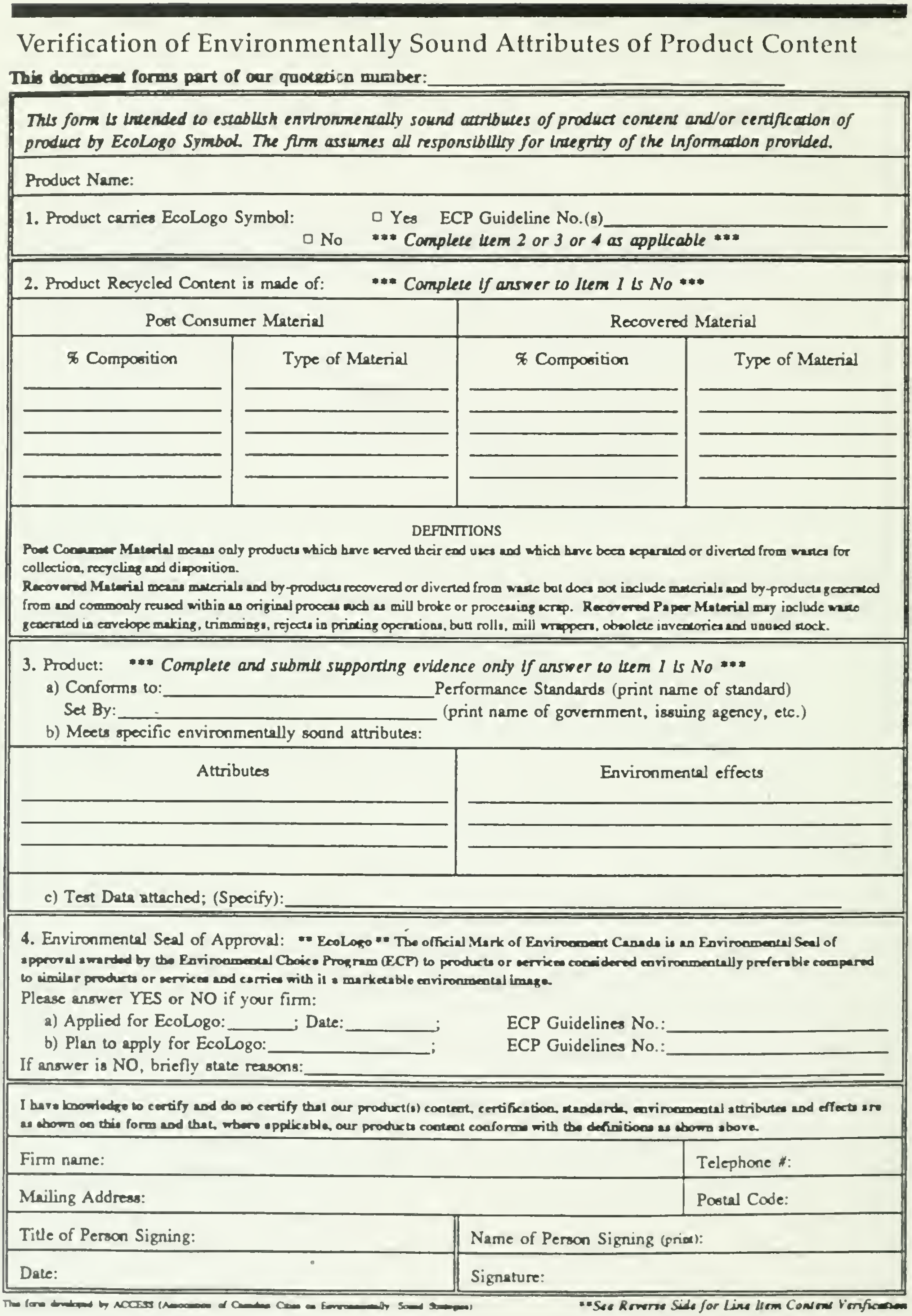
Environmental Considerations for Consumable Supplies

- Are the supplies designed to reduce consumption (e.g. rechargeable batteries)?
- Are the supplies designed to minimize waste (e.g. carbonless multi-part forms)?
- Are the supplies required by the equipment non-toxic and/or do they require special disposal considerations?
- Are recycled materials used to produce the supplies?
- Are the supplies reusable?
- Can the supplies be recycled or composted after use?

Environmental Criteria for Packaging

- Is the packaging designed to be minimal?
- Is the product packaged in bulk (if functional)?
- Is the packaging reusable, specifically will the supplier take it back for reuse or will the end user reuse it?
- Are recycled materials used to produce the packaging?
- Is the packaging material recyclable?

Source: G.I.P.P.E.R



Verification of Environmentally Sound Attributes of Product Content

This document forms part of our quotation number:____________________

This form is intended to establish environmentally sound attributes of product content and/or certification of product by EcoLogo Symbol. The firm assumes all responsibility for integrity of the information provided.

Product Name:

1. Product carries EcoLogo Symbol: ☐ Yes ECP Guideline No.(s)____________________
☐ No **** Complete item 2 or 3 or 4 as applicable ****

2. Product Recycled Content is made of: **** Complete if answer to Item 1 is No ****

Post Consumer Material		Recovered Material	
% Composition	Type of Material	% Composition	Type of Material

DEFINITIONS

Post Consumer Material means only products which have served their end uses and which have been separated or diverted from wastes for collection, recycling and disposition.

Recovered Material means materials and by-products recovered or diverted from waste but does not include materials and by-products generated from and commonly reused within an original process such as mill broke or processing scrap. **Recovered Paper Material** may include waste generated in envelope making, trimmings, rejects in printing operations, butt rolls, mill wrappers, obsolete inventories and unused stock.

3. Product: **** Complete and submit supporting evidence only if answer to item 1 is No ****
a) Conforms to:____________________Performance Standards (print name of standard)
Set By:____________________ (print name of government, issuing agency, etc.)
b) Meets specific environmentally sound attributes:

Attributes	Environmental effects

c) Test Data attached; (Specify):____________________

4. Environmental Seal of Approval: ** EcoLogo ** The official Mark of Environment Canada is an Environmental Seal of approval awarded by the Environmental Choice Program (ECP) to products or services considered environmentally preferable compared to similar products or services and carries with it a marketable environmental image.
Please answer YES or NO if your firm:
a) Applied for EcoLogo:______; Date:________; ECP Guidelines No.:____________
b) Plan to apply for EcoLogo:____________; ECP Guidelines No.:____________
If answer is NO, briefly state reasons:____________________

I have knowledge to certify and do so certify that our product(s) content, certification, standards, environmental attributes and effects are as shown on this form and that, where applicable, our products content conforms with the definitions as shown above.

Firm name:	Telephone #:
Mailing Address:	Postal Code:
Title of Person Signing:	Name of Person Signing (print):
Date:	Signature:

This form developed by ACCESS (Association of Canadian Cities on Environmentally Sound Strategies)

***See Reverse Side for Line Item Content Verification*

Source: G.I.P.P.E.R.

Contacts

Contacts

The following is a list of organizations, government agencies, and industry associations that can help recycling businesses.

Association of Municipal Recycling Coordinators
25 Douglas Street
Guelph, ON N1H 2S7
(519) 823-1990

The AMRC has several publications available of interest to those affected by the 3Rs Regulations and can offer advice on implementing 3Rs programs.

Build Green Program
ORTECH International
2395 Speakman Drive
Mississauga, ON L5K 1B3
(905) 822-4111 Ext. 372

The Build Green Program is a joint initiative of the Greater Toronto Home Builders' Association and ORTECH International. The primary objected of the program is to increase consumer and builder awareness of the wide range of building materials which have recycled content. Manufacturers who meet the criteria of the Build Green Program will soon be able to participate in the Build Green Label Program.

Business Development Unit
Ministry of Environment and Energy
135 St. Clair Ave. West, 5th Floor
Toronto, ON M4V 1P5
(416) 323-4219

The BDU provides green industry suppliers with business planning advice and access to private and public sector assistance networks, and helps firms to commercialize environmental technologies, services and products.

Canadian Association of Recycling Industries
#502, 50 Gervais St.
Don Mills, ON
M3C 1Z3
(416) 510-1244

The association represents over 300 recycling companies. CARI members recycle a wide variety of materials including ferrous and non-ferrous metals, paper, textiles, automotive parts, plastic and glass. The association can provide information on regional market conditions, business opportunities and news about the recycling industry.

Waste Reduction Office
Ministry of Environment and Energy
40 St. Clair Avenue West, 7th Floor
Toronto, ON M4V 1M2
(416) 324-4440

The WRO provides technical and market support for the development of 3Rs initiatives for a range of materials considered to be of strategic importance including construction and demolition materials, organics, paper fibres, plastics and tires.

Ontario Waste Exchange (OWE)
Canadian Waste Materials Exchange (CWME)
c/o Ortech International
2395 Speakman Drive
Mississauga, ON
L5K 1B3
(905) 822-4111

The OWE and CWME help industry, businesses and institutions find technologies and guidelines to minimize waste, and help find users and recyclers of waste. They offer many services to industry including waste exchange listings.

Ontario Waste Management Association
4195 Dundas St. West, Suite 320
Etobicoke, ON M8X 1Y4
(416) 236-0172

The OWMA speaks for more than 280 independent companies who are in the business of environmental protection through the proper management of waste, offering a broad range of services, including waste minimization, collection transport, processing, recycling, market development, transfer stations and landfills.

Recycling Council of Ontario (RCO)
#504, 489 College St.
Toronto, ON
M6G 1A5
1-800-263-2849

The RCO provides a secondary markets directory and information and resources on how to conduct waste audits and the steps to be taken in the implementation of a waste reduction plan.

The following organizations and associations may be able to assist with technical information regarding specific materials:

Fibres

Canadian Pulp & Paper Association
Sun Life Building
1155 Metcalfe St.
19th Floor
Montréal (PQ)
H3B 4T6
514-866-6621

Paper & Paperboard Packaging Environmental Council
#400, 701 Evans Ave.
Etobicoke, ON
M9C 1A3
416-626-0350

Plastics

Society of the Plastics Industry (S.P.I.)/ Environment and Plastics Institute of Canada (EPIC)
1262 Don Mills Road #104
Don Mills, ON
M3B 2W7
(416) 449-3444

Canadian Polystyrene Recycling Association
7595 Tranmere Drive
Mississauga, ON
L5S 1L4
(416) 612-8290

Organics

Ontario Horticultural Association
RR #2
St. George, ON
N0E 1N0
519-448-1537

Composting Council of Canada
#3-Q, 275 MacLaren St.
Ottawa, ON
K2L 0L9
613-238-4014

Glass

Consumers Glass
777 Kipling Avenue
Toronto, ON
M8Z 5Z4
(416) 232-3603

Textiles

Canadian Allied Textile Trades Association
49 Front St. East
Toronto, ON
M5E 1B3
416-363-4266

Canadian Textiles Institute
#502, 280 Albert St.
Ottawa, ON
K1P 5G8
613-232-7195

Construction and Demolition

Ontario Home Builders' Association
20 Upjohn Rd.
North York, ON
M3B 2V9
(416) 443-1545

Council of Ontario Construction Associations
c/o Greenspoon Bros. Ltd.
16 Melanie drive
Brampton, Ontario
L6T 4K9

Tires

Rubber Association of Ontario
#309 - 89 Queensway West
Mississauga, ON
L6B 2V2

Ministry of Transportation
Central Building, Room 135
1201 Wilson Avenue
Downsview, ON
M3M 1J8

Host group's name

Address

Many thanks to the following co-sponsors for their support of the new business workshop.

List of co-sponsors

List of exhibitors

Sample 6

NEW Business Opportunities for Recyclable Materials

GLASS
PLASTICS
FIBRE
WOOD
CONSTRUCTION AND DEMOLITION WASTES
TIRES
ORGANICS
TEXTILES
COMPOSITES

A workshop for entrepreneurs

Don't miss this opportunity!

You are invited to attend a half-day workshop to find out how to take advantage of the opportunities that exist in the recycling/reuse industry.

The *New Business Opportunities for Recyclable Materials* workshop will look at the opportunities, potential markets, financing options and government support programs.

You'll meet other entrepreneurs and those already in the business and hear about successful recycling businesses and key factors for success.

Please join us.

Location
Address
Time

Space is limited so please mail your registration today or call xxx-xxxx to confirm your participation.

Workshop Agenda

8:30 a.m.	Registration/view exhibits
8:45 a.m.	Introductory remarks - (name)
9:00 a.m.	Overview of business opportunities - Cathy Cirko, Ministry of Environment and Energy
9:30 a.m.	Recyclable materials available locally - (name/title)
9:50 a.m.	Break
10:10 a.m.	Guest speakers - names/ titles/companies
11:10 a.m.	Business planning - (name/title)
11:30 a.m.	Financing options and government support - (name/title)
12 noon	Lunch/networking

Registration

I wish to confirm my reservation for the workshop at a cost of $xx.

Name: ______________________

Title: ______________________

Company: ______________________

Address: ______________________

____

____

Tel: ( ) ______________________

Fax: ( ) ______________________

The fee includes PST and GST.
Cheques or money orders only please.
Cheques should be made payable to (name of group).